INTERACTION IN EU CLIMATE POLICY

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Executive summary

Climate policy is becoming increasingly crowded. Multiple instruments have been introduced at both the Member State and EU levels and new instruments are regularly being proposed. As the number of instruments grows, so does the potential for interaction between them. This interaction can be complementary and mutually reinforcing, but there is also the risk that different policy instruments will interfere with one another and undermine the objectives and credibility of each.

Despite calls for a coherent and co-ordinated policy mix, the topic of policy interaction is seriously neglected. There is little academic literature on the subject and policymakers in both the Commission and Member States have failed to consider policy interaction in a systematic way. For example, the European Climate Change Programme simply lists a wide range of policies, many of which would be incompatible if applied at the same time. This creates the risk that the policy mix will degenerate into a policy mess.

The aim of the INTERACT project is to develop a systematic approach to analysing policy interaction and to use this to explore the potential interactions between the proposed EU Emissions Trading Scheme (EU ETS) and other instruments within both EU and Member State climate policy. The specific objectives are to:

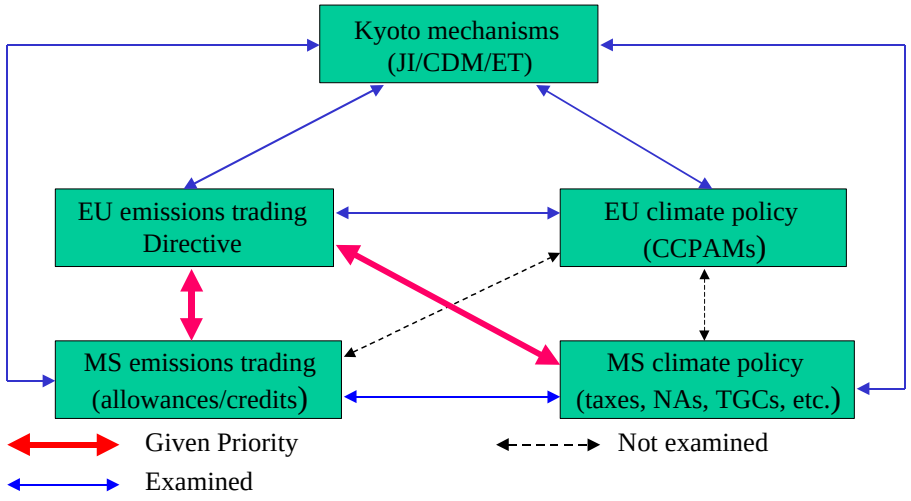
- identify potential overlaps, conflicts and synergies in the interactions between the EU ETS and other climate policy instruments at both the Member State and EU level;
- identify the key factors influencing these potential interactions;
- develop recommendations on how the EU ETS can be implemented so that it builds upon, and works in harmony with, existing policy instruments;
- develop recommendations on how other climate policy instruments can be designed, implemented or reformed to facilitate the introduction of the EU ETS; and
- develop a systematic approach to analysing policy interaction that can be applied in other policy areas.

The importance of the EU ETS cannot be overstated. The proposed scheme will initially cover some 45% of EU CO_2 emissions and as it expands over time to cover more sectors and greenhouse gases (GHGs), the scheme will cover an increasingly large proportion of the total emissions regulated under the Kyoto Protocol. The Commission is relying heavily on this scheme to deliver the EU's obligations under the Kyoto Protocol while the same time minimising the cost to EU industry. The INTERACT project therefore aims to both develop a new methodology for exploring policy interaction, and to make substantive policy recommendations in a critical policy area.

The approach

The focus of the INTERACT project is the interactions represented by the two bold lines in Figure E.1. However, the interactions represented by the other lines are also explored.

Figure E.1 The policy interactions studied in the INTERACT project



The relative absence of previous work on this topic has led the project to devote considerable attention to theoretical and methodological issues. The project employs a *policy design* framework which identifies the elements of policy instruments in general terms, together with the relationships between these elements, and uses this to match policies to particular problems. This framework facilitates the comparison of widely different policy instruments and is used to study policy interactions. The analysis of policy interactions leads in turn to the identification of policy options that may improve the performance of the policy mix against a selected set of evaluation criteria. The emphasis throughout is on identifying the likely consequences of different types of interaction and the nature of the trade-offs that can be made.

Policy interaction is analysed through a systematic comparison of:

- the *scope* of each instrument, where scope means the sectors, sites, portions of sites and individual emission sources that are directly or indirectly affected by each instrument;
- the *objectives* of each instrument and the extent to which these reinforce or conflict with one another;
- the *operation* of each instrument, including the aggregate effect of the different obligations and incentives when applied in combination.
- the *implementation* of each instrument, including the scope for rationalisation and harmonisation or regulatory responsibilities; and
- the *timing* of each instrument, including responses to 'triggers' and the scope for policy sequencing.

While such an approach can point to some general conclusions about the compatibility of different types of instrument, it is more usually the case that the degree of compatibility is context specific. Similarly, it is usually the case that different instrument combinations will involve trade-offs between criteria such as economic efficiency and political acceptability. The preferred combination will therefore depend upon the weight given to these different criteria.

The empirical work for the project was conducted by five project teams located in the UK, Germany, the Netherlands, France and Greece. The Partner institutes in each participating Member State selected a minimum of three national climate policy instruments, examined their potential interactions with the EU ETS and developed a number of policy recommendations. Table E.1 summarises the general categories under which the selected instruments fell.

Table E.1 Types of policy instruments examined in each case study

Category	UK	Nether-lands	Germany	France	Greece
Carbon/ energy taxes	✓	✓	✓		
Negotiated agreements	✓	✓	✓	✓	
Support mechanisms for renewable electricity	✓	✓	✓	✓	✓
Industrial pollution control	✓			✓	✓
GHG emissions trading	✓			✓	
Promotion of energy efficiency	✓				

The results from the project have been reported to an academic audience via papers in relevant journals, and to a stakeholder audience via reports, workshops and contacts with policymakers. Since the duration of the project paralleled the political evolution of the EU ETS, there have been several opportunities to contribute directly to the policy process

Typology and rationale

The project has developed the following typology of policy interaction:

- *Direct interaction*: where the target groups directly affected by two policies overlap in some way;
- *Indirect interaction*: where either: a) the target group directly affected by one policy overlaps with the target group indirectly affected by a second (or vice versa); or b) the target group indirectly affected by one policy overlaps with the target group indirectly affected by a second;
- *Operational interaction*: where two policies operate together in that either: a) individual target groups (companies, installations, sources etc.) may move from one policy to the other under certain conditions; or b) the obligations and incentives imposed by one policy are deliberately modified as a result of the coexistence of a second policy.

- *Sequencing interaction*: where one policy which directly affects a target group is followed in time by a second policy which directly affects the same target group.
- *Trading interaction*: where two policies are linked by the exchange of an environmental trading commodity, such as a GHG emissions allowance.

The project has then used this typology to develop a series of justifications for the coexistence of other instruments with carbon trading schemes such as the EU ETS. These justifications raise both theoretical issues regarding the legitimacy of government intervention and empirical issues regarding the design of individual instruments. In many cases there will be trade-offs between long-term and/or non-efficiency objectives and short-term increases in abatement costs. If the policy mix is to gain legitimacy, these objectives and trade-offs need to be made explicit.

Clarification of policy objectives is particularly important for instruments which coexist with the EU ETS. This is because the EU ETS guarantees the attainment of a particular, Europe-wide emission target. Any instruments which directly or indirectly interact with the EU ETS will contribute nothing further to overall emission reductions since they will simply 'free-up' allowances which may be purchased and used by other participants. The aggregate environmental impact of the scheme will therefore remain unchanged. Also, in the absence of market failures, the EU ETS should guarantee that the overall cap will be achieved at least cost. This implies that the use of a second instrument that directly or indirectly interacts with the EU ETS will increase the overall costs of meeting the cap.

With the EU ETS covering some 50% of EU CO_2 emissions, these results apply to a large proportion of the climate policy instruments in each Member State. The implication is that, once the EU ETS in place, such instruments can no longer be justified through their contribution to emission reductions but only through their contribution to other policy objectives. These include:

- improving the static efficiency of the EU ETS by overcoming market failures other than CO_2 externalities;
- improving the dynamic efficiency of the EU ETS by overcoming market failures in the area of technology innovation and diffusion;
- delivering social objectives other than efficiency, such as equity and political feasibility; and
- compensating for deficiencies in the EU ETS design.

The INTERACT project has elaborated these broad rationales to provide justifications for each of the specific instrument combinations listed in Table nn. In each case, however, the validity of such rationales is context specific and open to challenge.

Table E.2 Possible rationales for the coexistence of other instruments with a carbon emissions trading scheme

Type of interaction	Rationale
Direct and indirect	overcoming market failures inhibiting the adoption of energy efficient technologies
	overcoming market failures in the area of technology innovation and diffusion - particularly for renewable electricity
	achieving supplementarity through 'back-up' regulations
	raising revenue and capturing windfall rent
	achieving distributional objectives
Operational	using taxes to penalise non-compliance
	using 'hybrid' tax/trading instruments to mitigate allowance price uncertainty
	using opt-in provisions to extend the scope of the ETS
	using opt-out provisions to improve political acceptability
Sequencing	using trading to increase the flexibility of the existing policy mix
	using existing regulations as a basis for allowance allocation
Trading	Using horizontal trading interaction to achieve cost savings
	Using vertical trading interaction to achieve cost savings
	Using 'one-way' trading interaction to incentivise overcompliance

Issues

The potential interaction between the EU ETS and other climate policy instruments has been found to raise four generic issues:

- *Double regulation*: The issue here is the extent to which any apparent 'double regulation' will be seen as imposing unfair burdens upon particular target groups. Double regulation may be loosely defined as a situation where an individual target group is directly or indirectly affected by two or more instruments that have very similar objectives. While 'double regulation' is a negative term, there may be many instances where the interaction between policy instruments may be either acceptable or positively beneficial. To assess whether this is likely to be the case in any particular instance, it is necessary to examine the multiple objectives of each instrument, the obligations and incentives they place upon individual target groups, and the likely consequences in practice.
- *Double counting*: The issue here is the problems that arise when the compliance obligations for emission reductions are disputed - as may happen when two trading schemes coexist. This may lead to: a) *double slippage*, where the coverage of emissions is lost; b) *double coverage*, where two allowances are surrendered for a one-tonne increase in physical emissions; and/or c) *double crediting*, where two allowances are generated or freed-up for a one-tonne decrease in physical emissions. Each type of problem introduces complexity into the regulatory situation. But environmental integrity is only threatened when double crediting occurs without any compensating double coverage.
- *Differential treatment and equivalence of effort*: The issue here is the extent to which different groups are treated differently by environmental policy instruments and whether the obligations imposed upon one group can be deemed equivalent to those imposed upon another. Differential treatment may be challenged on legal, political or environmental

grounds and is of central importance in the political debate over climate policy. Demonstration of equivalence of effort may be required as a means to avoid differential treatment when an installation, company, sector or Member State is exempted from a particular policy instrument. But in practice, differences in the scope, form and stringency of policy instruments may make equivalence of effort extremely difficult to assess.

- *Trading interaction and the fungibility of trading commodities*: The issue here is the extent to which two trading schemes may be linked by the exchange of environmental commodities. The transfer of environmental commodities between two schemes will be governed by transfer and exchange rules which together define the *fungibility* of the trading commodities - which means the extent to which the commodity used for compliance with the first scheme can also be used for compliance with the second. These rules will determine the scope for trading between the two schemes and the consequences of such trading.

The EU ETS

The themes, issues and rationales introduced about were found to recur repeatedly in the empirical research in each Member State. The appropriate policy response will depend upon the estimated consequences of interaction and the weight given to criteria such as environmental integrity. Since the consequences of the policy interaction could be judged negatively in many cases, it is possible that the EU ETS will trigger quite fundamental reviews of Member State climate programmes. This will occur only a short period after these programmes were introduced and regardless of whether individual climate policy instruments are considered to be 'working'. In some cases –notably the UK - the EU ETS may turn an early start in climate policy into a false start.

While a rationalisation of the policy mix may be an appropriate response to the EUETS, this may not always occur. Governments may be reluctant to abandon tried and tested instruments in favour of an unfamiliar alternative, and the inertia of existing instruments may make them difficult to displace. The net result may be a mix of overlapping, interacting and conflicting instruments which lack any overall coherence.

These negative judgements need to be balanced against the substantial opportunities that the EU ETS offers over the longer term. The INTERACT project has clearly demonstrated that policies can work effectively in combination and that such combinations can often be more effective than individual instruments in isolation. The challenge, therefore, is to identify the circumstances in which this will be the case, and those in which it will not, and to design policies accordingly.

The project has made a number of specific policy recommendations for each of the participating Member States. These recommendations vary according to the specific circumstances of the Member State and the interpretations given by each of the Partner teams. But the following principles may be highlighted.

- *Goals*: The development of policy options should be based upon clear principles and long-term goals. For climate policy, a stable and effective policy framework is required during the Kyoto commitment period. This means that policy should be developed by *working back* from where we want to be in 2008, rather than developing short-term expedients.

- *Carbon pricing*: Energy users in all sectors should pay for carbon emissions, whether through taxation or emissions trading. In the long term, organisations in the public, commercial and industrial sectors should *either* be paying a carbon tax *or* participating in a trading scheme. Supplementary policies will be required to address other barriers to energy efficiency and to achieve other policy objectives, such as promoting renewables. But for each target group, only a single instrument should be used for carbon pricing.
- *Electricity:* The direct approach to electricity emissions used in the EU ETS is preferable to the indirect approach used in a number of national climate policies because: first, it gives compliance obligations for electricity emissions to the companies directly responsible for the control of those emissions, thereby incentivising both fuel switching and energy efficiency; and second, it facilitates cross-border electricity trade in the EU.
- *Targets:* Absolute targets are to be preferred over relative targets because of their greater environmental integrity and consistency with the national emission targets under Kyoto. And allowance based trading is to be preferred over baseline and credit trading due to its greater economic efficiency, lower transaction costs and consistency with the Kyoto framework. The EU ETS reflect these considerations while the many of the existing policies at the Member State level do not. The latter should therefore be considered as transitional measures only.
- *Supplementarity:* There is a risk that abatement in the EU ETS will be achieved through purchasing cheap 'hot air' from outside the scheme, rather than through domestic action. But domestic abatement may be incentivised by either restricting the interface between the EU ETS and the international carbon market, or by retaining (or establishing) 'backup' regulations for EU ETS participants. The first approach is preferable, but is dependent upon the final outcome of the proposed 'linking' directive. In general, 'backup' regulations should be avoided as they are likely to undermine economic efficiency, be more complex to administer and lead to additional costs for the target groups.

There is scope for debate over these principles and over the specific recommendations given in each of the case study reports. But the main point is to encourage wider recognition of the challenges and opportunities that the EU ETS creates.

1. Introduction

Environmental policy has grown enormously over the last 30 years. As environmental policy matures so the number of policy instruments has grown, together with the potential for interaction between different instruments. This interaction can be complementary and mutually reinforcing, but there is also the risk that different policy instruments will interfere with one another and undermine the objectives and credibility of each.

In common with many recent statements by the European Commission, the European Climate Change Programme (ECCP) calls for a '…coherent and co-ordinated framework of policy instruments….avoiding double or multiple regulation' (CEC, 2000a). Moreover, the Commission recognises that sustainable development can only be achieved through the integration of environmental considerations into all areas of policy (CEC, 1999). This requires a mixture of instruments in different policy areas (trade, fiscal, environment) all operating in harmony. At present, however, neither the Commission or individual Member States appear to consider policy interaction in a systematic way. For example, the ECCP simply lists a wide range of policies, many of which would be incompatible if applied at the same time (as appears to be intended). This points to the need for new tools to facilitate the construction and co-ordination of portfolios of instruments in order to promote positive interaction, and to avoid major conflicts in the delivery of policy objectives.

The aim of the INTERACT project is to develop such a tool and test it in the area of EU climate policy. More specifically, the aim of the project is to use this tool to analyse the potential interactions between the proposed EU Emissions Trading Scheme (EU ETS) and other instruments within both EU and Member State climate policy.

The importance of the EU ETS cannot be overstated. The proposed scheme will initially cover some 45% of EU CO_2 emissions and as it expands over time to cover more sectors and greenhouse gases (GHGs), the scheme will cover an increasingly large proportion of the total emissions regulated under the Kyoto Protocol. The Commission is relying heavily on this scheme to deliver the EU's obligations under the Kyoto Protocol while the same time minimising the cost to EU industry. While there is much work to be done, notably in devising acceptable allocation rules at the national level, the key elements are now in place for a historic leap forward in the implementation of market-based environmental instruments.

The EU ETS is a challenging area in which to explore policy interaction since, first, emissions trading is fundamentally different from much of existing EU and Member State environmental policy; and second, policy decisions taken over the next few years will set the framework for delivering greenhouse gas emission reductions to 2012 and beyond. The INTERACT project thus aims to both develop a new methodology for exploring policy interaction, and to make substantive policy recommendations in a critical policy area.

The INTERACT project was conducted over a two-year period between March 2001 and March 2003. The project was co-ordinated by SPRU (Science and Technology Policy Research) at the University of Sussex (UK), in collaboration with: the Energy Research Centre of the Netherlands (ECN), the Fraunhofer Institute for Systems and Innovation Research (ISI), the Centre International de Recherche sur l'Environnement et le Developpement (CIRED), and the Energy Policy Group (EPG) at the National and Kapodistrian University of Athens (NKUA). SPRU was responsible for the overall direction

of the project, while each Partner was primarily responsible for empirical research within their own Member State.

From the beginning, the project aimed to contribute results to both an academic audience, via papers in relevant journals, and a stakeholder audience via reports, workshops and contacts with policymakers. The project has succeeded in both these aims (see Annex 1) and has led to researchers becoming engaged in consultancy projects on the implementation of the EU ETS at the Member State level. The fact that the duration of the project paralleled the political evolution of the EU ETS has created both difficulties and opportunities. On the one hand, this has meant the project has been studying a moving target, with reports and outputs rapidly becoming outdated. On the other hand, it has created many opportunities to contribute directly to the policy process

Structure of the report

This report summarises the results of the INTERACT project and provides both theoretical conclusions and practical policy recommendations. The report is supported by five country reports containing the detailed results of the empirical research within each Member State, and six policy briefs summarising the key results from the project in an accessible form. The reports and policy briefs are all available on the project web site:

http://www.sussex.ac.uk/spru/environment/research/interact.html.

A full list of accompanying reports, together with related papers and articles, is contained in Annex 1.

The contents of this report are as follows

Section 2 summarises the project's objectives, scope, analytical framework and research methods including the content and sequence of the work programme. This section also outlines the basic features of the EU ETS.

Sections 3 to 5 describe the methodological and theoretical results from the project. The relative absence of previous work on policy interaction has led to methodological issues being given considerable attention.

Section 3 sets the scene by examining the basic elements of policy design. For example: What is the policy trying to achieve? What incentives are being used? What assumptions are being made? By breaking down policy design in this way, it is possible to develop a common framework and a common terminology that facilitates the comparison of widely different policy instruments. This framework can then be used to explore policy interaction.

Section 4 provides an overview of policy interaction by examining in turn: classifications of policy interaction; previous work on policy interaction; a typology of policy interaction; a framework for studying policy interaction; and the issues raised by policy interaction – including 'double regulation' and 'differential treatment'. The focus in this section is on policy interaction in general terms, using the ideas and concepts developed in section 3. The typology and the framework for studying interaction form the basis of the empirical work conducted in each Partner country.

Section 5 examines the interaction between carbon emissions trading and other policy instruments in theoretical terms. The discussion draws upon the framework set out in Sections 3 and 4 and examines the design of a carbon emissions trading scheme, the indirect impact of an emissions trading scheme, compliance obligations and the 'double counting' of emission reductions, and the rationales for the coexistence of other instruments with a carbon trading scheme. An important result from this section is that, under a standard set of assumptions regarding the idealised operation of allowance and product markets, the use of a second instrument that directly or indirectly interacts with an emissions trading scheme will increase the overall costs of meeting the emissions cap while at the same time having no influence on environmental effectiveness. Nevertheless, there may be legitimate grounds for the coexistence of such instruments with a trading scheme, such as improving the static or dynamic efficiency of the scheme, delivering objectives other than efficiency, or compensating for deficiencies in trading scheme design. This section explores these rationales in some detail.

Sections 6 to 10 summarises the implications of the EU ETS for climate policy in the five Partner countries - UK, Netherlands, Germany, France and Greece. Each section reports on a subset of the policy interactions studied during the project, with the instruments being selected on the basis of their relative importance and the extent to which they illustrate generic problems of policy interaction. For each instrument, the scope, objectives, operation, implementation and timetable of the instrument are compared with that of the EU ETS, the nature and consequences of the interactions are explored, policy options are identified and specific policy recommendations are provided. Each section also draws some general conclusions on policy interaction and on the wider implications of the EU ETS for the Partner country. More detailed results for each Partner country are contained in the national case study reports.

Section 11 summarises some of the main conclusions from the project, while Annex 1 lists the main outputs and dissemination activities.

2. Aims, objectives and methods

2.1 Project objectives

The INTERACT project has three objectives:

1. to analyse the potential interaction between greenhouse gas emissions trading and other instruments within EU and Member State climate policy;
2. to develop recommendations on the design and implementation of Member State and EU climate policy, to ensure that greenhouse gas emission targets are achieved efficiently and effectively; and
3. to develop a general methodology to assist policymakers in analysing the interaction between different policy instruments.

When the INTERACT project was originally proposed, it was envisaged that emissions trading would develop in the EU through the bottom-up evolution of national trading schemes. But in practice, the EU Emissions Trading Scheme (EU ETS) has supplanted many of these national initiatives and is expected to set the framework for GHG emissions trading in the EU for the foreseeable future. As a consequence, the INTERACT project has focused more narrowly on the potential interactions between the EU ETS and other climate policy instruments at both the Member State and EU level. The specific objectives of the project are then:

- to identify potential overlaps, conflicts and synergies in the interactions between the EU ETS and other climate policy instruments at both the Member State and EU level;
- to identify the key factors influencing these potential interactions;
- to develop recommendations on how the EU ETS can be implemented so that it builds upon, and works in harmony with, existing policy instruments;
- to develop recommendations on how other climate policy instruments can be designed, implemented or reformed to facilitate the introduction of the EU ETS; and
- to develop a systematic approach to analysing policy interaction that can be applied in other policy areas.

2.2 The scope of the project

The term climate policy is used here to refer to measures which have a primary or subsidiary aim of reducing greenhouse gas emissions. These include energy taxes, negotiated agreements, support mechanisms for renewable electricity and subsidies for investment in energy efficiency. Measures such as these have been used for many years to achieve broader policy objectives, such as security of supply or social equity. Furthermore, climate change is a pervasive challenge which touches upon most areas of public policy (e.g. agriculture, transport, housing, land use planning). This means that the scope for interaction between climate policy and other areas of public policy is very large indeed.

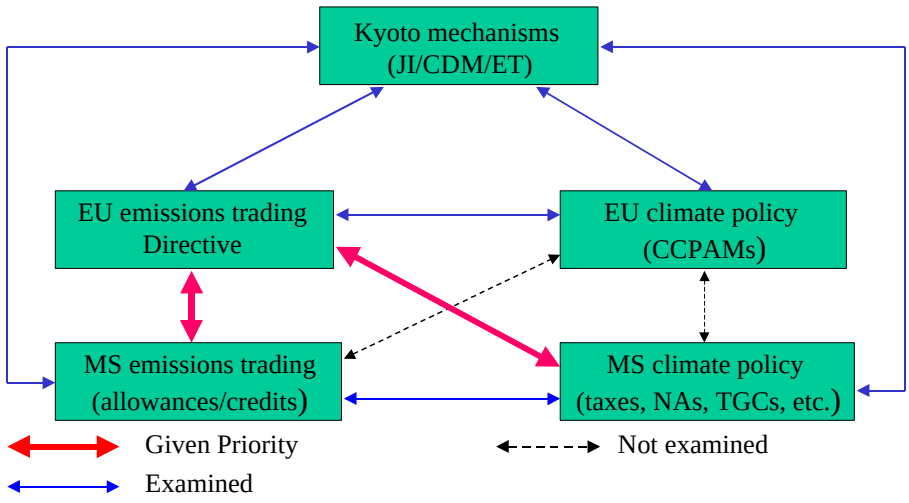
The focus of the INTERACT project, however, is the interactions that are *internal* to climate policy – that is, between individual climate policy instruments. This means that interactions between climate policy and other policy areas (e.g. trade, air quality) are not explored, although in practice they may be important.

Within climate policy, the focus of INTERACT is the interaction between the EU ETS and other climate policy instruments and on those interactions which are considered to be of particular economic importance. Priority is given to studying the interactions represented by the two bold lines in Figure 2.1, namely:

- interactions between the EU ETS and GHG emissions trading schemes at the Member State level; and
- interactions between the EU ETS and other climate policy instruments at the Member State level.

However, several of the other interactions indicated in Figure 2.1 have been explored during the course of the project, including those between the Kyoto Mechanisms and Member State climate policy.

Figure 2.1 The policy interactions studied in the INTERACT project



2.3 The EU Emissions Trading Scheme

On the 23rd October 2001, the European Commission issued a proposal for an EU-wide scheme for greenhouse gas emissions trading (CEC, 2001). This was approved, although in different terms, by the European Parliament on the 10th October 2002 and European Council on the 9th December 2002. The proposed Directive passed a second reading in the European

Parliament in July 2003, and the remaining differences between the Council and the Parliament are in the process of being resolved at the time of writing. The Directive should be adopted in late 2003, which means that there is a good chance that the scheme will come into force in 2005 as planned.

The design of the EU ETS represents a pragmatic compromise between economic efficiency and political acceptability. The Council text accommodates the concerns of key Member States such as Germany and has won the broad support of both industry lobbyists and mainstream environmental groups.

The EU ETS is a downstream 'cap and trade' scheme along the lines of the US Acid Rain Program. The ~5000 participants in the scheme include electricity generators, oil refineries and energy intensive manufacturing installations in sectors such as iron and steel, paper and minerals. Estimates made on behalf of the Commission suggest that the scheme will reduce total abatement costs by some 24%, leading to cost savings of some €2.1billion/year by 2010 (Capros and Mantzos, 2000). Table 1 summarises the main features of the 'Council text' (Council of the European Union, 2002), the 'Parliament text' (European Parliament, 2002) and the original European Commission proposals (CEC, 2001). The final shape of the Directive may differ from each of these proposals.

The Directive was the subject of intense negotiation and the Commission found it necessary to compromise in several areas in order to secure political agreement. Four particularly contentious issues were:

- *Opt-outs (Article 23a-Parliament, 25a-Council)*: The Commission proposed a mandatory scheme, but this was opposed by the UK and Germany. The Parliament text allows installations to opt-out during Phase 1 (2005-2007), but participation is mandatory during Phase 2 (2008-2012). The Council text extends this temporary exemption to 'activities' (sectors). According to both texts, opt-outs will only be permitted if installations/activities can demonstrate equivalence in terms of emission reductions, monitoring, reporting and verification requirements and the penalties for non-compliance.
- *Opt-in and phase-in (Article 2a-Parliament, 23a Council)*: The Parliament text contains two provisions for an early extension of the ETS. First, Member States shall be able to extend the scheme to additional sectors, activities and installations (opt-in) from 2005, although the Commission may reject these proposals. Second, other gases shall be phased in as soon as methods of measurement, monitoring and calculation are developed by the Commission. The Council text allows unilateral extensions only from 2008, while harmonised extensions require an amendment to the Directive.
- *Allocation (Article 9 and Annex III)*: The Commission text requires free allocation in Phase 1 and states that the Commission shall specify a harmonised method of allocation for Phase 2. The Council text, requires free allocation during Phase 1, while Member States are allowed (but not required) to auction up to 10% of allowances during Phase 2. The Parliament text demands 15% auctioning for both Phases. In all three texts, national allocation plans are subject to approval by the Commission and must be consistent with: national burden sharing targets; progress towards meeting those targets; national energy and climate change policies; the technological potential of the installation to reduce emissions; and state aid and internal market rules.[1] This mixture of top-down and bottom-up requirements will be difficult to interpret and disputes over allocation could lead to

[1] The Council text adds the additional option of 'accommodating' early action.

delays. The Parliament text requires new entrants to receive allowances in the same manner as other participants while allowances will not be given to installations that have retired. The Commission and Council texts are silent on these issues.

- *Interfaces (Article 26):* Another directive will develop 'modalities' governing links between the EU ETS and the Kyoto project-based mechanisms (JI and CDM) during 2003, while mutual recognition agreements may be signed between the EU ETS and trading schemes created by other Parties to the Kyoto Protocol. The prospect of such links could reopen the supplementarity debate, as there is a risk that the purchase of 'hot air' will substitute for domestic abatement (Climate Action Network Europe, 2003).

Table 2.1 Key elements of the EU ETS – comparing Commission, Council and Parliament proposals

Area	Requirements
Compliance periods	Phase 1: 2005-2007 Phase 2: 2008-2012 (i.e. the first Kyoto Protocol commitment period).
Type of target	Absolute targets (Commission, Council) Mixture of absolute and relative targets (Parliament). New entrants and extending installations to receive allowances in the same way as other participants. Closing plants will not continue to receive allowances
Allocation of allowances	Phase 1: Free (Commission, Council); 15% auctioning (Parliament). National allocation plans subject to approval by the Commission. Phase 2: to be decided later (Commission); 15% auctioning (Parliament); maximum 10% auctioning (Council)
Sectors included	All combustion plant >20MW thermal input, including electricity generators Oil refineries, coke ovens, ferrous metals, cement clinker, pulp from timber, glass and ceramics. Parliament: also Chemicals Based on IPPC, but some IPPC sectors excluded (e.g. food and drink, waste incineration) Sites below IPPC size thresholds in eligible sectors may also be included (Council, Parliament)
Size of market foreseen	4000-5000 installations 45% of all EU carbon dioxide emissions
Basis	Phase 1: only direct CO_2 emissions (Commission, Council); other gases may be included (Parliament) Phase 2: other gases may be included, provided adequate monitoring and reporting systems are available and provided there is no damage to environmental integrity or distortion to competition
Links with JI/CDM	Emission credits from JI and CDM projects to be recognised from 2005 (Council) or 2008 (Parliament), subject to 'modalities' to be adopted by the EU by 2005
Links with other countries schemes	Agreements with third parties listed in Annex B of the Kyoto Protocol may provide for the mutual recognition of allowances between the EU ETS and other schemes
Monitoring, Reporting and Verification	Common monitoring, verification and reporting obligations to be elaborated. Verification through third-party or government authority.
Allowance tracking	Linked/harmonised national registries with independent transaction log.
Sanctions	Phase 1: 40 €/tCO_2 penalty (Council), 50 €/tCO_2 (Commission, Parliament) + restoration in next period Phase 2: 100 €/tCO_2 penalty + restoration in next period
Banking	Banking across years within each compliance period Commission, Council: Member States can determine banking from Phase 1 to Phase 2. Parliament: banking allowed.

Source: CEC (2001), European Parliament (2002), Council of the European Union (2002)

2.4 The analytical framework

2.4.1 Previous work

Surprisingly, given the proliferation of environmental policy instruments over the last few decades (Weale, 1992; Haigh, 1998), there has been little research into how these instruments interact. Most of the existing literature focuses on the design of individual instruments in

isolation. If policy interaction is considered at all, it is very much a subsidiary issue and the treatment is relatively superficial (e.g. Jülich & Falk, 1999; Schaeffer, 1999).

A full analysis of interaction would need to integrate legal, economic and political considerations, together with an understanding of the realities of policy implementation. However, this is rarely achieved. For example, there is a limited amount of US literature relevant to policy interaction and emissions trading, but the primary focus of this is the interaction between emissions trading and the economic regulation of US utilities (Hahn and Noll, 1983; Bohi and Burtraw, 1992; Coggins and Smith, 1993). Furthermore, the disciplinary approach is confined to orthodox economics.

As Member States prepared to introduce the EU ETS into an extremely crowded policy mix, the need for a systematic consideration of policy interaction becomes increasingly urgent. This is illustrated, for example, by the Integrated Pollution Prevention and Control Directive (IPPC), which may now need to be revised to prevent it constraining the scope for emissions trading (CEC, 2002). The INTERACT project therefore aims to address both the theoretical issue of how policy interaction can be understood and analysed, and the empirical issue of how this may facilitate the implementation of the EU ETS. To do this, the project adopts a policy design framework combined with the use of stakeholder workshops.

2.4.2 Policy design

INTERACT is not concerned with evaluating the performance of existing policies, or explaining why a particular policy was adopted. Instead, the primary aim is to develop a systematic process for developing *policy options* and a framework for comparing them. This means that the project is not based upon the collection of empirical evidence about a particular, specific and historical situation, but is instead forward looking, qualitative and inevitably somewhat speculative.

In developing policy options, INTERACT employs a *policy design* framework. This identifies the elements of policy in general terms, together with the relationships between these elements, and uses these to match policies to particular problems. By breaking down policy design in this way, it is possible to develop a common framework and a common terminology that facilitates the comparison of widely different policy instruments. In turn, this framework can be used in the study of policy interactions.

The likely consequences of individual policy options can be explored qualitatively and in some cases quantitatively through the use of economic models. But in all cases the performance of different policy options need to be assessed within a *multi-criteria* framework, in which the relative weight that is given to different criteria (e.g. economic efficiency, environmental effectiveness) are made explicit. This is a subjective process and for INTERACT it can only be done in a relatively crude way. The emphasis throughout the project is on identifying the likely consequences of different types of interaction and the nature of the trade-offs that can be made.

2.4.3 Stakeholder workshops

The policy options can be developed through desk based research. But the plausibility and desirability of these options is best tested out through stakeholder interviews and stakeholder workshops. These can be used to evaluate the proposed policy options against a set of

evaluation criteria, propose modifications to these options, and construct alternative options. Relevant participants in these workshops include representatives from Member State governments, regulatory agencies, business (particularly the energy sector), universities, think tanks and NGOs.

Doing the course of the INTERACT project, each Partner institute conducted two or more stakeholder workshops in their host country. These workshops were small with the emphasis on focused discussions and each proved extremely valuable in generating discussion, insights and specific policy suggestions.

2.4.4 The analytical process

The analysis of policy interaction involves the paired comparison of two policy instruments in a systematic fashion. In INTERACT, the first instrument is the EU ETS, while the second is a climate policy instrument at the EU or Member State level. This process is repeated several times and is conducted as follows:

1. The fundamental features of the EU ETS are analysed by characterising it along five dimensions: i) the scope of the instrument, ii) the nature of the objectives, iii) the operation of the instrument, iv) the mechanisms for implementation; and v) the timetable of the instrument.
2. This analysis is repeated for the fundamental features of the second policy instrument.
3. The nature and consequences of the interactions between these two instruments are explored by systematically comparing the two instruments along each of the above dimensions - i.e.:
    - the sectors, sites, portions of sites and individual emission sources that are directly or indirectly affected by each instrument;
    - the extent to which the objectives of each instrument reinforce or conflict with one another;
    - the aggregate effect of the different obligations and incentives imposed by each instrument upon the target groups.
    - the overlaps in implementation, including the scope for rationalisation and harmonisation of regulatory responsibilities; and
    - the overlaps in timing, including the scope for policy sequencing.
4. A multi-criteria framework is used to evaluate the consequences of these interactions against an agreed set of evaluation criteria (e.g. static efficiency, political acceptability).
5. The outcome of this assessment is used to guide the development of two or more, quite different, policy options with the aim of improving the performance of the policy mix against one of more of the evaluation criteria. For each of these options, the interaction analysis and multi-criteria evaluation is repeated.
6. The results are used to develop recommendations for the design of an effective and integrated policy portfolio.

Box 1 illustrates the application of this process to the interaction between the energy efficiency requirements of the IPPC Directive and the EU ETS.

Box 2.1 Interaction between IPPC and the EU ETS

1. IPPC is analysed both in terms of its fundamental features and the specific nature of its implementation in the UK. IPCC is identified as an engineering based, bottom up, technology driven form of regulation, requiring hands on implementation by the regulator. Flexibility is largely achieved through negotiation with individual site inspectors.
2. The EU ETS is analysed in a similar manner. Trading is an economics based, top down, target driven form of regulation, where implementation is hands off. Flexibility and cost effectiveness is achieved through buying and selling allowances.
3. The majority of participants in the EU ETS are regulated under IPPC. The latter regulates carbon emissions indirectly through its energy efficiency provisions but does not impose emission limits on CO_2. The key variable influencing interaction is the interpretation of these energy efficiency requirements at the EU, Member State and individual site level.
4. Policy options can be derived, based upon different interpretations of the IPPC energy efficiency provisions. For example:

- a *strict* interpretation, based on quantitative BAT limits for energy use;
- a *minimalist* interpretation, where energy efficiency is treated as a secondary consideration under IPPC; and
- a *participation* interpretation, where the requirements are assumed to be fully met through participation in the EU ETS.

5. The recommendation of a *minimalist* interpretation under IPPC is based upon an analysis of the implications of each option for the fulfilment of various policy objectives, and the performance of each option against a number of evaluation criteria. A minimalist interpretation allows for the future viability of carbon trading, while at the same time ensuring that minimum standards of energy efficiency are obtained. A series of more detailed recommendations can also be made, based on an analysis of other implementation issues such as timetabling and system boundaries.

Further information: Smith & Sorrell (2001); Sorrell (2003).

2.4.5 The partner countries

The empirical work for INTERACT is conducted by five project teams located in the UK, Germany, the Netherlands, France and Greece. These countries differ in:

1. their stringency of targets under the EU burden sharing agreement - with the cost of abatement varying significantly;
2. their instrument mix for climate policy - with administrative, voluntary and market based policies all being represented to varying degrees;
3. their approach to the Kyoto mechanisms - with the level of enthusiasm and knowledge varying greatly;
4. their institutional arrangements for energy (particularly electricity) supply - with wide differences in the extent of energy market liberalisation; and
5. their adoption of national emissions trading schemes - with the UK and France having fully developed schemes, Netherlands and Germany having developed serious proposals for such schemes which were subsequently abandoned in the light of the EU ETS, and with Greece being relatively slow to develop a position on this issue.

These differences are reflected in the project results and in the policy recommendations. However, with the exception of Greece, the similarities in the project results are more noticeable than the differences.

2.4.6 The selection of policy instruments

The Partner institutes in each participating Member State selected a minimum of three national climate policy instruments and examined their interactions with the EU ETS. The selected instruments represented either existing policies or formal legislative proposals which had a primary or subsidiary aim of reducing greenhouse gas emissions, and which either directly or indirectly affected the target groups participating in the EU ETS. Examples include:

- implementation of the IPPC at the Member State level;
- voluntary or negotiated agreements on energy efficiency or GHG emissions;
- carbon and energy taxes;
- obligations upon electricity suppliers to purchase 'green' electricity, including tradable green certificates; and
- obligations upon electricity suppliers to invest in energy efficiency in low income households.

Table 2.2 summarises the general categories under which the selected instruments fall. Note that there is frequently more than one instrument within each general category.

Table 2.2 Types of policy instruments examined in each case study

Category	UK	Nether-lands	Germany	France	Greece
Carbon/ energy taxes	✓	✓	✓		
Negotiated agreements	✓	✓	✓	✓	
Support mechanisms for renewable electricity	✓	✓	✓	✓	✓
Industrial pollution control	✓			✓	✓
GHG emissions trading	✓				
Promotion of energy efficiency	✓				

2.5. The approach

The project was conducted in four stages: methodology, empirical context, analysis and synthesis.

The first stage of the project concentrated upon developing a methodology for understanding, analysing and evaluating policy interaction. This drew upon three sources: the policy analysis and political science literature, including papers on the topic of 'policy design' (Schneider, and Ingram, 1990); the existing work on policy interaction, including Gunningham and Gabrosky (1998) and Johnstone (2002); and the basic elements of multi criteria analysis (DETR, 2000a; Weimer and Vining, 1999). The outcomes of this stage, which are summarised in Sections 3 to 5, included a standardised approach to characterising and describing policy instruments as well as analysing policy interactions.

The second stage developed a thorough understanding of the empirical context of climate policy and emissions trading at the international, EU and Member State level. This had three elements. First, a review of both the international context and the academic and policy literature on emissions trading (Boemare and Quirion, 2002). Second, a review of EU climate policy and the European Climate Change Programme(ECCP), with particular focus on the EU ETS. Third, a review of national climate policy in each of the participating Member States, including both 'conventional' instruments and any proposed GHG emissions trading schemes. Each instrument was characterised and evaluated according to a common format, to facilitate the subsequent analysis. Ongoing policy developments meant that this stage was subject to constant review. For example, Germany and the Netherlands abandoned their proposals for national GHG emissions trading schemes during the course of the project, while the new Dutch government introduced major reforms to energy taxation and the promotion of renewable electricity. The results of this work were reported in full in a series of interim reports from the project (Annex 1).

The third stage involved the analysis of policy interaction within each of the participating Member States. This was conducted in parallel by the five Partners institutes, using the methodology outlined above and drawing upon the results of the empirical reviews. The desk based analysis was complimented by a number of stakeholder interviews, followed by two or more stakeholder workshops to test and review the results. The results, including both the theoretical insights and policy recommendations, are described in full in the Member State case study reports (Annex 1).

The final stage, a synthesis of results is contained in this report.

3. Principles of policy design

3.1 Introduction

The INTERACT project is developing proposals for the selection and design of climate policy instruments at both the Member State and EU level. The motivation for developing these recommendations is the identification of conflicts between different policy instruments, together with a search for synergies between instruments.

Policy design involves:

- defining the policy problem;
- suggesting alternative options to address the policy problem;
- assessing the feasibility of different options;
- clarifying (as far as possible) the consequences of different options;
- assessing those consequences against a set of criteria; and
- recommending particular options as the preferred way forward.

The design of policy instruments is the subject of an extensive literature, much of which focuses upon individual instruments, such as emissions trading. But for INTERACT it this helpful to take a step back and look at the elements of policy design in more general terms. For example: What is the policy trying to achieve? What incentives are being used? What assumptions are being made? By breaking down policy design in this way, it is possible to develop a common framework and a common terminology that facilitates the comparison of widely different policy instruments. This, in turn, can be used in the study of policy interaction.

This section examines policy design in conceptual terms. It abstracts from the details of individual instruments to identify the common elements of policy design and the relationships between these elements. This framework is used in section 4 to explore the issues surrounding policy interaction in a systematic way.

3.2 Elements of policy design

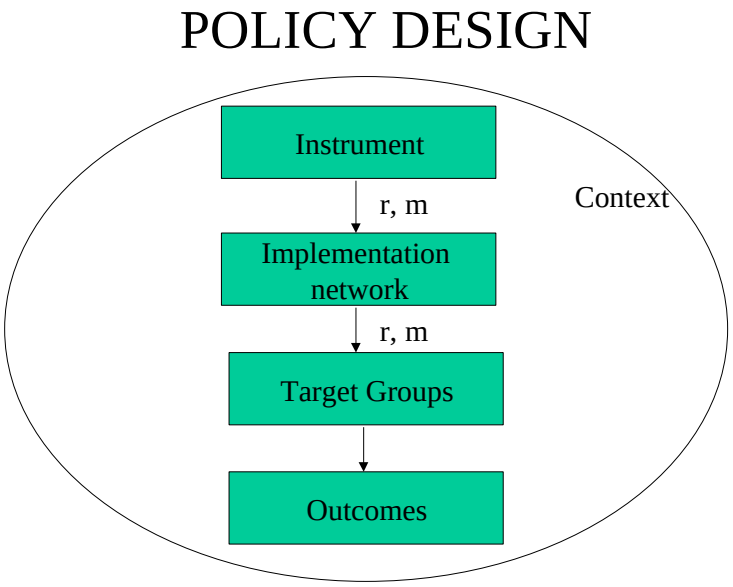
Figure 2.1, which is based on Schneider & Ingram (1990), shows that policy design can be broken into four main elements - *instrument, implementation network, target group(s) and outcomes.* These are linked by *rules* and *influencing mechanisms* and situated within a political, economic and cultural *context*. The logic of the diagram may be summarised as:

- Instruments establish rules and influencing mechanisms for both the target group(s) and the organisations involved in implementation. The rules may give scope for varying degrees of discretion.
- The rules and influencing mechanisms impose *obligations* on the target group(s), create *incentives* for the target group(s), and/or enhance the *capacity* of the target group(s). If the assumptions of the instrument design are correct (and in the absence of countervailing

factors) this will lead the target group(s) to take actions that bring about the desired outcomes.

Each of these ideas is expanded below.

Figure 3.1 Elements of policy design



- *Instrument*: This is the legislation, law, regulation, initiative etc. which has been introduced by a governing body to address a particular problem and achieve one or more specified *objectives*. Objectives are desired policy outcomes. The diagram can operate on different levels of generality, from broad policy programs to specific policy initiatives within those programs. Similarly, the diagram can refer to different levels of governance, including international, EU and Member State.
- *Implementation network*: This is the mix of public and private organisations which need to be mobilised to implement the policy and influence the target group(s). In environmental policy, the normal characterisation is of a single regulatory agency imposing requirements upon industry. This characterisation is oversimplified, and it is better to consider a network of interacting organisations.
- *Target group(s):* This is the group of economic actors (individuals or organisations) that the policy aims to influence in order to achieve its objectives. An important distinction is between *directly* and *indirectly* affected target groups:
  - A *directly* affected target group has obligations and incentives imposed upon it directly by a policy instrument. Directly affected target groups may be defined in technical, economic, political or administrative terms, but for our purposes they will be defined in terms of the *control* that they have over the relevant activity. For example, the EU ETS refers to 'any person who operates or controls an installation….to whom decisive economic power over the technical functioning of the installation has been delegated' (KOKO). While control may be through ownership, it could also be through the terms

and conditions of the contract governing the operation of the activity (e.g. an energy services contract).

- An *indirectly* affected target group is influenced in some way by the behavioural changes that are made by the directly affected group. For example, electricity suppliers may have an obligation to purchase a percentage of their electricity from renewable sources. The price premium for this electricity would then be passed on to electricity customers. The suppliers are directly affected by the policy and their customers are indirectly affected. The indirect effects of a policy permeate throughout the economy and need to be analysed within a general equilibrium framework. But for the purpose of INTERACT, attention may be confined to those indirect impacts which are considered to be of particular economic significance. The first order impacts on product markets frequently fall into this category.

- *Outcomes and objectives:* Outcomes refer to the effects of policy, whether intended or unintended. Policy objectives refer to desired outcomes. Typically, policies will have multiple objectives which may be defined with varying degrees of precision. Similarly, when in operation, policies will have multiple outcomes which may be valued as either positive or negative by different groups. Outcomes are the result of a complex chain of processes involving both directly and indirectly affected target groups. Policy objectives may refer to outcomes at any point along this chain. For example, the objective of a policy may be investment in CHP by the directly affected target groups, or the resulting reduction in emissions by the indirectly affected electricity generators. From an economic perspective, objectives are best expressed with reference to theories of market or government failure (Weimer and Vining, 1999). But in practice, the specification of policy objectives tends to be much looser.
- *Context*: This is the broader economic, political and cultural context in which the policy operates and which imposes constraints on the design of individual policies. For INTERACT, the most important contextual factors are the *other* policies and measures which affect either the implementation network or the target group and which may affect the attainment of policy objectives.

Policy design links the first four elements by *rules (r)* and *influencing mechanisms (m)* (Schneider & Ingram, 1990, p86-87). While policy objectives define what the policy is trying to achieve, the rules and influencing mechanisms define how it is trying to achieve it. These apply both to the implementing network and the target group(s) and may be defined as follows:

- *Rules:* These tell the directly affected target group(s) and implementing organisations what they must (or may) do, what they must not do, when to do it, and how it should be done (Schneider & Ingram, 1990, p86). Rules impose *obligations*, but this does not imply rigid, top-down implementation. Organisations may work within a framework of rules, but these may give considerable scope for discretion and professional judgement. Similarly, rules may imply varying degrees of conditionality (e.g. prohibition; prohibition with exemptions; concessions; licenses; obligation to notify etc.) (Bemelmans-Videc et al, 1998 p42).
- *Influencing mechanisms:* These are the means by which the policy ensures that actions are taken in accordance with the rules and in support of the desired objectives (Schneider & Ingram, 1990, p87). Influencing mechanisms provide *incentives* and/or *enable* individuals or organisations to do things that they might not otherwise do (Schneider & Ingram, 1990,

p87). Policy instruments are commonly defined in terms of the primary influencing mechanism used for the target group(s). These include:

- *sanctions*: which encourage compliance with formal rules and directives (e.g. fines);
- *positive economic incentives:* which provide positive payoffs for desired behaviour (e.g. subsidies, grants, loans, tax credits, tax exemptions);
- *negative economic incentives:* which deprive targets of some material resource (e.g. taxes, levies, tariffs, fees);
- *capacity*: which involve the provision of knowledge, information, resources, training etc. to enable individuals or organisations to take the desired actions; and
- *symbolic*: which do not change payoffs, but aim to alter perceptions and values.

The design of a policy instrument will be based on assumptions about the extent to which the target group(s) will take action in accordance with the rules and influencing mechanisms. For example, energy taxes may be based on assumptions about energy price elasticities, while instruments based on moral suasion may be based on assumptions about how individuals will respond to appeals to their values. Different instruments will use different behavioural assumptions and the effectiveness of an instrument will depend upon the validity of those assumptions.

The fact that two instruments use different assumptions need not make them incompatible. For example, individual decision-making on energy use may in practice be based on *both* energy prices and environmental values. Economic instruments assume the former while broader climate awareness campaigns assume the latter. Therefore, two separate instruments that each target a single aspect of decision-making may be mutually reinforcing.

Any policy design must specify the instrument type, the implementation network, the directly affected target group(s), the policy objectives and the rules and influencing mechanisms at an appropriate level of detail. The success of the instrument will depend upon the extent to which it is matched to relevant features of the implementation network, target group(s) and broader policy context.

The next four sections consider instrument type, the implementation network, the target group and the wider context in more detail.

3.3 A typology of policy instruments

It is common in the environmental policy literature to use a simple binary classification of environmental policy instruments, with ‘command and control’ on the one hand and ‘economic instruments’ on the other. This oversimplifies the reality of environmental policy, where a much broader range of instruments are employed. Table 2.1 proposes a more detailed classification, which places instruments on a continuum from the least to the most *interventionist*. Here, intervention is defined as a mix of *prescription*, which means the extent to which external parties determine the level, type and method of environmental improvement; and *coercion*, which means the extent to which external parties or instruments place negative pressure on a organisation to improve performance (Gunningham & Gabrosky, 1998).

Each type of instrument has strengths and weaknesses and is therefore more or less appropriate for specific environmental problems and for specific technical, economic or political situations. Moreover, the strengths and weaknesses of each instrument depend very much on details of their design. For example, economic instruments have the advantages of cost effectiveness, incentives for innovation and minimal information requirements. But they may be politically unpopular and have undesirable distributional impacts. Similarly, economic instruments may not be suitable for pollutants which are difficult to monitor and for which no proxy is available (e.g. leakage of VOCs at a petrochemical plant). Here, voluntary approaches or site-specific implementation of framework regulation (e.g. BAT) may be more appropriate.

Table 3.1 A typology of environmental policy instruments

Broad category	Instrument type	Nature	Examples
Education, information & moral suasion	Education, information & moral suasion	Corrects lack of information, builds capacity to respond, appeals to values and/or attempts to modify values	• Education and training • Corporate environmental reporting • Community right to know • Pollution inventories (e.g. US TRI) • Product certification/labelling
Voluntary approaches	Unilateral commitments	Voluntary undertaking by firms or industry groups	• Responsible Care program • 1995 German industry declaration on climate change
	Public voluntary schemes	Voluntary adoption of standards, procedures, targets etc. which have been developed by public bodies	• EMAS • UK Making a Corporate Commitment Campaign • US Green Lights program
	Negotiated agreements	Contracts between public authorities and industry including targets, timetable and implicit or explicit sanctions for non-compliance.	• Dutch covenants • UK climate change levy agreements
Economic instruments	Charge systems	Internalises external costs through charges on consumption or production	• UK climate change levy • German energy tax
	Trading mechanisms	Creates a market in pollution rights	• Cap and trade programs • Baseline & credit programs • Kyoto mechanisms • Tradable green credits
	Financial instruments	Mobilising financial resources for environmental protection (e.g. loans, funds, tax breaks)	• UK capital allowances for investment in energy efficient equipment

	Liability instruments	Inducement to internalise external costs through threat of subsequent legal action to recover costs	•
	Removal of perverse incentives	Removal of existing subsidies to environmentally damaging activities and products	• Removal of subsidies for coal production
Command and control	Framework based standards	Qualitative performance requirements requiring interpretation	• BATNEEC • ALARP
	Performance based standards	Uniform quantitative performance requirements	• emission limits under the LCPD
	Technology based standards	Uniform requirement to use a particular technology	• German legislation on FGD

Source: Adapted from Gunningham & Gabrosky (1998), pp37-91.

3.4 A typology of regulatory participants

Traditionally regulation has been thought of in binary terms with a single regulatory agency imposing requirements upon industry. But a more accurate characterisation is of a wide variety of public and private organisations becoming engaged in different ways with an equally wide variety of policy instruments. Gunningham and Gabrosky (1998) have demonstrated the important role that this broader array of participants can play in environmental policy and have argued strongly that mobilising third party actors is an essential element of effective regulatory design (Gunningham and Gabrosky, 1998, pp93-125).

From this perspective, policy implementation can be seen as a complex interplay between three groups:

- *First parties:* This is the government and regulatory agencies. Government functions are increasingly being devolved to a large number of semi-autonomous agencies (Rhodes, 1997). Several agencies may be involved in a single policy area and their objectives may not always be coincident. For example, there are conflicts between the objectives of the economic regulator of the privatised utilities in the UK and those of environmental and social bodies such as the Environment Agency and the Energy Savings Trust. This conflict is one aspect of policy interaction. Effective regulation involves integration of the policies of these disparate agencies.
- *Second parties*: This includes the direct target group, such as energy intensive industry, but also associated organisations such as trade associations. The latter may become engaged in the negotiation of regulatory targets, the monitoring of progress towards those targets, and in ensuring compliance among their members. The extent to which this is possible will depend upon the coherence of the sector and the ability of the trade association to 'deliver' its members. Various forms of voluntary or self regulation may play an important role in the regulatory process.
- *Third parties*: This includes a wide range of commercial and non-commercial organisations that can also become involved in the regulatory process. For example, environmental audit organisations may become involved in verifying monitoring data and compliance with emission targets. These organisations may have the potential to take the regulatory burden off government agencies and also to exert pressure on the target group in a variety of ways. Relevant organisations include environmental consultants, public interest groups, NGOs and financial institutions.

Part of the process of policy design is to identify which parties have the potential to contribute to the implementation of a policy in a particular circumstance. This involves identifying the full range of relevant parties, together with their capacity and their willingness to contribute. For example, in the case of emissions trading, commercial bodies from the financial sector may have a role to play as brokers or organisers of permit auctions.

3.5 Characteristics of the target group

The third element in the policy design framework is the target group. These are the individuals or organisations that the policy aims to influence in order to achieve its objectives. In all cases, the selection and design of policy instruments will be shaped by the characteristics of these groups. Relevant characteristics include:

- *Location in the causal chain*: The primary criterion for selecting target groups should be their role in the causal chain of events that leads to desired objectives. For example, policies to reduce emissions from electricity generation may be aimed at fossil fuel suppliers, electricity generators, electricity suppliers, electricity consumers, or technology suppliers. The choice has important implications for incentives and abatement options. For example, electricity generators have direct control over the carbon intensity of electricity generation, but only indirect and partial control over total electricity demand. In contrast, electricity consumers have direct control over their electricity demand, but no control over the carbon intensity of electricity generation. While the *direct* target group has obligations and incentives imposed upon it directly by the policy, there are a wide range of *indirect* target groups which are affected by the behavioural changes made by the direct target group. Of particular interest is the extent to which the additional costs imposed by a policy instrument on the business sector are indirectly borne by consumers, suppliers and shareholders.
- *Physical characteristics*: There are two sets of considerations here. The first relates to the physical characteristics of the environmental problem, including the nature of the pollutant(s), the geographical scope of the problem, the dependence of the problem on the location of the source(s), the relationship between emissions and environmental damage (i.e. the slope of the damage curve), and the ease with which the pollutant can be monitored. The second relates to the physical characteristics of the target group, such as the number, size and homogeneity of the pollutant sources. As an illustration, an ETS is assumed to be only viable where there are a relatively small number of sources and where these are sufficiently large and sophisticated to deal with the contractual requirements of permit trade.
- *Capacity*: Capacity refers to the ability of the target group to meet the objectives of the policy, or to respond to the obligations and incentives created by the policy. Capacity cannot, therefore, be judged in the abstract, but only in relation to specific objectives, obligations and incentives, which are in turn linked to a timetable. Capacity is determined by technological and economic factors, as well as the informational, organisational and other resources available to the target group.
- *Political influence:* Political influence refers to the role of organised interest groups in the process of policy formulation. This influences the political feasibility of the policy proposals. Political influence depends upon factors such as the degree of organisation of relevant interest groups and the extent of access they have to the policymaking process.

Policy instruments need to be matched to the relevant characteristics of the target group. While there is no general theoretical framework to govern such ‘matching’, it is generally implicit in most of the relevant policy literature. For example, Box 3.1 summarises the conditions under which an ETS is assumed to be in appropriate.

Box 3.1 Characteristics of the target group which facilitate the success of an ETS

- The pollutant or good is readily quantifiable and easily measurable.
- The environmental objective is clearly defined, sufficiently stringent to pose a challenge to the regulated parties, and unlikely to be modified for a reasonable period of time.
- There are a large number of point sources of pollution, where the organisations involved are sufficiently large and sophisticated to deal with the contractual requirements of permit trade.
- The environmental problem is not tied too closely to the location of the source, thereby allowing a large number of sources from a wide geographical area to participate in trade.
- There is variation in abatement cost between sources, thereby providing significant scope for cost saving through permit trade.
- The market is not dominated by one or a small number of sources who hold the majority of the permits and are therefore in a position to exercise market power.
- There is a perceived need for greater flexibility in regulation, so permit trading can act as a cheaper means of meeting a binding target.
- The use of alternative policy instruments, notably the imposition of taxes or charges, is not considered to be politically feasible.

Source: Sorrell & Skea (1999)

3.6 Characteristics of the policy context

The final element in the policy design framework is the broader *context* in which the policy operates. This has economic, political, legal and cultural dimensions and is defined here as a separate set of factors to those directly concerning the target group or the implementation network.

It is difficult to characterise these broader features in a way that can usefully assist in policy design. Possible candidates include: state capacity for developing policy initiatives; public support for policy initiatives; and national policy styles. The last refers to the idea that individual countries process problems in a specific manner regardless of the nature of the problem itself (Vogel, 1986). For example, enduring features of the UK regulatory style include administrative discretion, co-operation, confidentiality and minimum use of the courts.

For INTERACT these wider features can be ignored. Instead, the focus is solely on the constraints imposed by the existence of *other* policies at the national, EU or international level. For example, EU rules on state aid will constrain the means by which allowances can be allocated in a trading scheme. We can distinguish between:

- the two or more policies which are the *focus* of the interaction analysis and for which we are developing design options; and
- the wider policies and measures which act as *constraints* on the design of these policies.

The constraints imposed by the wider policies and measures take the form (Majone, 1989):

- You must rule out option A because of reasons R. To do otherwise would lead to consequences C which are considered unacceptable.

So, for example:

- The existence of the internal market requires that companies in the same sector in different countries be subject to broadly comparable regulations. This means that national trading schemes must allocate emission targets that are of comparable stringency to those in other countries. To do otherwise would amount to illegal state aid and would be challenged under the rules of the internal market.

To identify a constraint is to identify what cannot be done and to identify why it cannot be done (Majone, 1989). Constraints are pervasive but also fuzzy - they may be known only imperfectly, and/or they may require interpretation. Constraints will also vary with time. In the long run, some constraints may disappear or become less important. At the same time, new constraints may arise which may or may not be anticipated.

It is important to distinguish constraints from evaluation criteria, such as efficiency and equity. The latter are desirable properties of a policy instrument, but they may be traded off against each other. For example, we may be prepared to accept a loss of efficiency provided we have greater certainty of an environmental outcome being reached. But a constraint cannot be traded off against another constraint. The logic of a constraint is that it must be met. As many constraints cannot not defined with precision, it is a matter of judgement whether a constraint has been or is likely to be met. But there are no explicit trade-offs involved.

3.7 Evaluating policy designs

Policy designs need to be assessed against a set of *evaluation criteria*. The selection and relative weighting of such criteria is a value judgement that will differ between stakeholders. Similarly, the assessment of the performance of options against these criteria may be informed by quantitative analysis, but is ultimately a subjective judgement.

A basic framework for assessing policy options is multi criteria analysis (Table 3.2). This is based on a performance matrix in which the columns are policy options, the rows are evaluation criteria and the cells contain judgements about the performance of options against these criteria (DETR, 2000a, p24). The performance assessments may be measured in cardinal numbers, graded on a scale (e.g. 1 to 5), represented in binary terms (yes/no), or described in qualitative terms.

Table 3.2 Multi-criteria analysis

Criteria	Weight	Policy option		
		1	**2**	**3**
a	Wa	S_1a	S_2a	S_3a
b	Wb	S_1b	S_2b	S_3b
c	Wc	S_1c	S_2c	S_3c
Rank		**R1**	**R2**	**R3**

The performance matrix may be used to identify a single most preferred option, to rank options, to shortlist options, or to provide a framework for 'mapping' the perspectives and preferences of different stakeholders (DETR, 2000a, p22; Stirling & Mayer, 2000). Generally, the objective is not so much to identify a single 'best' option but to use the framework to explore the nature of the trade-offs that can be made.

INTERACT is dealing with qualitative and highly uncertain judgements about the desirability of alternative policy proposals. Hence, multi criteria analysis can only be used in a very simple and straightforward way. In the empirical work conducted during the project, the performance of different policy options is assessed against the non-weighted set of standard criteria listed in Box 3.2, using a simple numerical scale from 1= poor to 5=good.

Box 3.2 Evaluation criteria for policy proposals

- *environmental effectiveness*: defined as the likelihood of the policy achieving a specific environmental objective.
- *static economic efficiency*: defined as the potential to minimise the direct costs of meeting an environmental objective in the short term;
- *dynamic economic efficiency*: defined as the potential to promote technological innovation;
- *administrative simplicity*: defined as the administrative burden on both the target group and the implementing organisations;
- *equity*: defined as fairness in burden sharing between the target group and other groups. In particular, this relates to impacts on sectoral and national competitiveness.
- *political acceptability*: defined as the acceptability of the proposal by key groups in the economy.

3.8 Summary

This section has attempted to characterise policy design and policy evaluation in general terms. The aim has been to develop a common framework and common terminology to assist in the study of policy interaction. The key points include:

- *Elements*: Policy designs can be broken down into four core elements - *instrument*, *implementation network*, *target group* and *outcome(s)*. These are linked by rules and influencing mechanisms which impose *obligations* on the target group, create *incentives* for the target group and/or enhance the *capacity* of the target group to take action. Policy design involves specifying all of the above elements in an appropriate level of detail.

- *Instruments*: A basic typology of environmental policy instruments is useful, even though the boundaries between different instruments are blurred. Each instrument type has particular strengths and weaknesses and is therefore more less appropriate in different situations.
- *Implementation*: Policy implementation is best seen as a complex interplay between first parties (including government departments and regulators); second parties (including the target group and associated organisations); and third parties (including a wide range of commercial and non-commercial organisations). Part of the process of policy design is to identify which parties have the potential to contribute to implementation in a particular circumstance.
- *Target groups:* Policies must be matched to the relevant characteristics of the target group, such as their location in the causal chain, their physical characteristics and their capacity to respond to the relevant incentives. The matching of instrument to the target group is not a systematic or if precise process but will determine the success of the policy proposal.
- *Evaluation*: The potential performance of different policy designs need to be assessed against a list of evaluation criteria. This is a subjective process and for the INTERACT project it can only be done in a fairly crude way using qualitative judgements. The emphasis is on identifying the nature of the trade-offs that can be made.

4. Principles of Policy Interaction

4.1 Introduction

This section provides an overview of the topic of policy interaction by examining in turn.

- classifications of policy interaction;
- previous work on policy interaction;
- a typology of policy interaction;
- a framework for studying policy interaction; and
- issues raised by policy interaction - namely double regulation and differential treatment.

The focus throughout is on policy interaction in general terms, using the ideas and concepts developed in section 3. Section 5 looks more specifically at policy interaction and emissions trading.

4.2 Classifying policy interactions

Policy interaction exists when the operation of one policy affects the operation or outcomes of another. It is useful to distinguish:

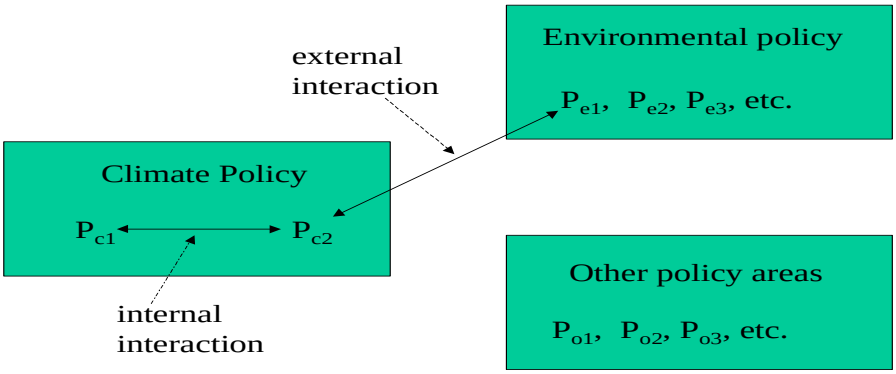
- *internal interaction*: between two or more policy instruments in the same policy area; and
- *external interaction:* between two or more policy instruments in separate policy areas.

The term *policy area* can be defined at different levels of generality: e.g. environmental policy, climate policy, industrial energy efficiency policy. In INTERACT, climate policy is taken as a definable policy area and the relevant distinction between internal and external interaction becomes:

- *internal:* interaction between two or more climate policy instruments; and
- *external*: interaction between a climate policy instrument and a non-climate policy instrument.

It is helpful to categorise non-climate policy instruments into two broad groups: *environmental* policy, and *other* policy - which includes energy policy (Figure 4.1).

Figure 4.1 Internal and external interaction



Additional complications are created by the fact that interactions occur between policy initiatives at different levels of governance. For INTERACT, the most relevant levels are national, EU and international. We can then distinguish between:

- *horizontal interaction*: between two or more policies from the same level of governance; and
- *vertical interaction*: between two or more policies from different levels of governance.

Table 4.1 combines the categories for policy area and governance level and gives examples of relevant policies in each area.

Table 4.1 Examples of policies in each area and from each governance level

Policy Level	Policy area		
	Climate policy	**Environmental policy**	**Other relevant policy**
International	*FCCC & Kyoto Protocol* • IET, JI, CDM	*Intentional. environmental agreements* • Montreal Protocol	*International trade policy* • WTO
EU	*Common & co-ordinated measures* • Removal of fossil fuel subsidies • Energy products tax	*EU environmental policy* • EMAS • IPPC • Communication on environmental agreements	*EU competition policy & other areas* • State aid provisions • Electricity & Gas Directives
Member State	*National climate change strategies* • Negotiated agreements • Carbon taxes • Support for renewable electricity	*National environmental policy* • Industrial pollution control • Waste policy (incineration; landfill)	*National competition policy & other areas* • Economic regulation of energy utilities

The primary focus of the INTERACT project is internal interaction within climate policy - the shaded area in Table 4.1. However, the boundaries of climate policy are difficult to define and much of what is termed climate policy has multiple objectives which are frequently unrelated to climate change. For example, the promotion of household energy efficiency in the UK is primarily justified in terms of its contribution to reducing fuel poverty. Indeed, much of what goes under the heading of climate policy is a relabelling of existing policies and initiatives. Clear demarcation of internal and external interactions then becomes difficult.

Within climate policy, the primary focus of INTERACT is the internal interaction between the EU ETS and other policy instruments at both the EU and national level. The project focuses on those interactions which are considered to be of particular importance - for example, between an ETS and support mechanisms for renewable electricity. However, this does not exclude the study of external interactions. For example, the interaction between a GHG ETS and the IPPC Directive may be considered 'external' as IPPC is not primarily a climate policy instrument. But since this interaction is considered particularly important, it is also studied in the project.

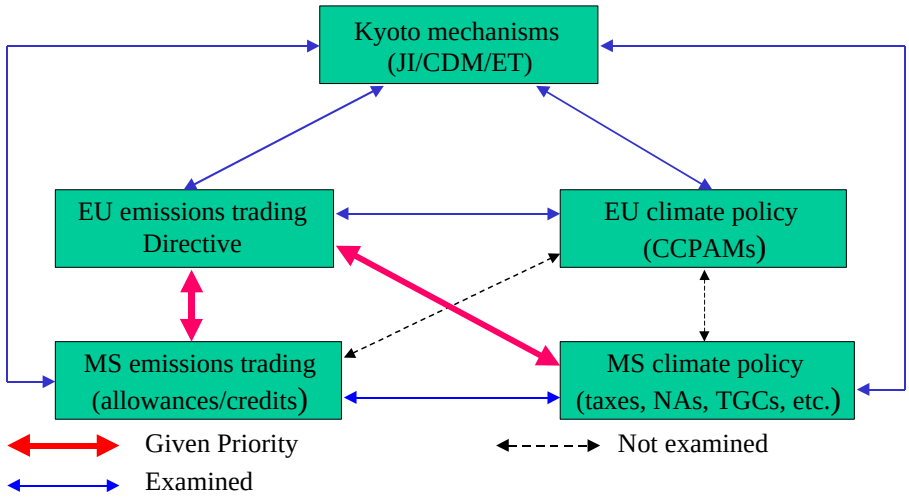
Figure 4.2 summarises the primary focus of INTERACT. Priority is given to studying the interactions represented by the two bold lines, namely:

- interactions between the EU ETS and GHG emissions trading schemes at the Member State level; and
- interactions between the EU ETS and other climate policy instruments at the Member State level.

It is these interactions which form the primary focus of the country studies. However, during the course of the project, attention was also paid to interactions between:

- the EU ETS and the Kyoto mechanisms;
- the EU ETS and other EU climate policies;
- the Kyoto mechanisms and Member State ETS;
- the Kyoto mechanisms and other Member State climate policies; and
- Member State ETS and other Member State climate policies.

Figure 4.2 The policy interactions studied in the INTERACT project



4.3 Previous work on policy interaction

Policy interaction is neglected in the academic literature:

> 'The tendency has been to evaluate instruments as individual entities and to consider their characteristics in relative isolation. This is in marked contrast to the political context within which they must operate..... the policy world is very crowded and there are already multiple instruments in place. ... There is as yet very research on how to co-ordinate instruments or on the ways in which instruments interact..... There is a great deal of wishful thinking as a result.' (Guy Peters and van Nispen, 1998).

The following sections summarises some useful general insights from three earlier studies which explicitly address the problem of policy interaction. More specific work on emissions trading is discussed in section 5.

4.3.1 Internal interaction and policy congestion

A useful way of viewing internal interaction is provided by Majone's discussion of *policy space* (Majone, 1989, p158-161). This notes that interconnections between policies are

pervasive - everything is related to everything else. Nevertheless, some interactions are more important than others.

The term policy space is used to denote '…a set of policies that are so closely interrelated that it is not possible to make useful descriptions about one of them without taking the other elements of the set into account' (Majone, 1989). The structure of a policy space then includes both the design of the individual instruments and the linkages between them. Climate policy can be viewed as such a policy space, albeit relatively immature and fragmented.

Both Majone and Wildavsky (1979) argue that policy development within such a policy space is increasingly autonomous - that is, policy becomes its own cause. As the population (and complexity) of policies grows relative to the 'size' of the space, individual policies necessarily become more interdependent. The consequences produced by one policy are increasingly likely to interfere with the workings of another. Majone uses the term *congestion* to describe the negative consequences of this: '...in an already crowded policy space, solutions beget new problems in the form of policy overlaps, jurisdictional conflicts and unanticipated consequences.' (Majone, 1989, p160). This is particularly the case where there is discretion in implementation and decisions are made at lower levels.

Wildavsky (1979) considers this internal interaction to be a prime cause of much policy development. Solving these internally generated problems may become as important as responding to external changes. This perspective seems increasingly appropriate to climate policy as the number of instruments increase. It is rather negative, however, in that it emphasises the conflicts and ignores the potential synergies between policies.

4.3.2 External interaction and adaptive policies

Majone emphasises the importance of internal interactions within a congested policy space. But empirical work suggests that external interactions can also be very influential. For example, in Glachant et al's (2000) study of the interpretation of EU environmental directives, the impact of policy interactions on policy outcomes was found to be pervasive. Interactions occurred with:

- Pre-existing domestic policies which covered the same environmental problem but which were more ambitious (e.g. between the Municipal Waste Incineration Directive and national standards for incinerator emissions)
- Other environmental policies emerging at the national, EU or international level (e.g. between the Eco-Management and Audit Scheme and ISO 14001); and
- Non-environmental policies such as energy market liberalisation (e.g. between the Large Combustion Plant Directive and UK electricity privatisation).

Glachant comments that the implementation of an EU Directive has to be seen as part of a 'complex patchwork of dynamic interactions across a multi-level and multi-centred policy system' (Glachant, 2001). While the original objective of the project was to analyse the effectiveness of policy implementation, the pervasiveness of interactions meant that a simple link between policy and outcome could not be found. Hence, the project recast the research

question as: ‘how can the implementation of a particular regulation cope efficiently with policy interactions?’

The proposed solution was that policies should be designed and implemented in such a way that they are *adaptive*. Suggested ways of achieving this include (Glachant, 2001):

- *Flexibility*: This is defined as the ease with which the policy instrument can adjust to achieve the desired policy objective when exogenous changes occur. This means avoiding over-specifying the means by which regulated agents achieve policy objectives - in other words, minimising prescription. Economic instrument score well in this respect, while some forms of ‘command and control’ regulation do not.
- *Integration:* Flexibility is a passive way of coping with policy interaction. But it is also possible to actively exploit the synergies or reduce the inconsistencies between policies through the *integration* of parallel measures into a broader policy mix. This means designing policies so that they operate together - for example, using the imposition of a carbon tax as a penalty for non-compliance with a negotiated agreement.
- *Horizontal co-ordination:* Unanticipated negative interactions can result from a lack of co-ordination between different branches of the policy system dealing with different policy areas. This is particularly prevalent in political systems that include specialised departments and different levels of governance. This can be avoided through horizontal co-ordination and improved integration of different initiatives.
- *Policy learning* The importance of ex-post surprises creates a need for reporting requirements, together with timetables and procedures for policy reviews.

These recommendations require interpretation and development in individual contexts and Glachant et al to not give any further insights on how they may be achieved. The emerging literature on the wider theme of ‘environmental policy integration’ suggest that this may be very difficult (Hertin and Berkhout, 2003). The recommendations are returned to in section 5 in relation to emissions trading.

4.3.3 Smart regulation

The book *Smart Regulation* by Gunningham & Gabrosky (1998) provides a rare example of a study focused explicitly on policy interaction. On the basis of a detailed cross-country study of environmental regulation in the chemical and agricultural sectors, Gunningham and Gabrosky make three claims about policy design:

- *Policy mixes*: All environmental policy instruments have strengths and weaknesses and none are sufficiently flexible to be able to address the full range of environmental problems. Hence, instead of treating instruments as alternatives, a better strategy is to harness the strengths of individual instruments while compensating for their weaknesses by the use of additional and complementary instruments. In the majority of circumstances, a mix of instruments is required, tailored to specific objectives.
- *Implementation networks*: A mix of policy instruments will work more effectively if a broader range of participants are involved in implementation. This means the direct involvement, not only of government and government agencies (first parties), but also business and other targets of regulation (second parties), and a range of other interested actors (third parties).

- *Contextual design*: The appropriate mix of instruments and actors will depend upon the nature of the environmental problem, the target group and wider contextual factors. Furthermore, while some combinations of instruments will be complementary, others may be neutral and others may be in conflict. Hence, it is necessary to match instruments to the imperatives of the environmental issue being addressed, to the specific context of the target groups, and to the availability, resources and characteristics of third parties.

Each of these claims refer to policies to address a *single* environmental problem - in other words, internal interaction. These claims are then developed into a set of design principles for such policies, which include:

- *Prefer policy mixes incorporating a broader range of instruments and institutions*. Combinations of instruments may overcome the deficiencies of individual instruments while taking advantage of their strengths. While not all combinations are complementary, many have the potential to be more effective than single instruments acting alone. Similarly, the involvement of multiple actors in the regulatory process can reduce administrative burdens and/or increase the effectiveness of regulation (e.g. via a threat to withdraw a loan due to environmental liabilities).
- *Prefer less interventionist measures where they are likely to be viable*: Highly prescriptive instruments score badly on flexibility, cost effectiveness, and administrative resources, while highly coercive solutions score badly on political acceptability. This principle is analogous to Glachant's recommendation for flexibility, but is only valid where there is a strong likelihood that the less interventionist measure will succeed.
- *Ascend a instrument pyramid to the extent necessary to achieve policy objectives*: If it is not possible to identify ex ante when an instrument will be effective, it may be possible to ascend a pyramid of more interventionist instruments. For example, if a particular firm fails to participate in a voluntary agreement, the regulator may respond by imposing mandatory requirements. Here, the two instruments *coexist* and are differentially imposed upon individual participants according to their performance. For example, industries with an accredited environmental management system may be granted a relaxation of regulatory requirements.
- *Introduce instrument sequencing*: Here, escalation up the regulatory pyramid is achieved by introducing instruments at different times. In the event that an instrument turns out not to be viable, another more interventionist option could be introduced. An example is the use of voluntary agreements on GHG emissions, with the implicit or explicit understanding that if the targets are not met a more interventionist measure such as a carbon tax will be introduced.

While combinations of policy instruments may be beneficial, not all combinations will be complementary. In fact, Gunningham and Gabrosky (1998, p423) suggest five possible ways in which instruments may interact:

- *Complementary*: For example, information based instruments are likely to be complementary to most other policy instruments while at the same time being unlikely to be adequate in themselves to achieve environmental objectives. Similarly, negotiated agreements may be complementary to 'command and control' regulation, if the latter defines a minimum performance benchmark and voluntary measures are used to encourage firms to go beyond this benchmark.

- *Complementary if sequenced*: Instruments that would be incompatible if applied simultaneously may be made compatible if their introduction is sequenced in time. For example, a more interventionist measure could be held in reserve and only introduced if the less interventionist measure failed. Thus, a negotiated agreement could include the sanction that, if the targets are not met, an emission tax will be imposed.
- *Incompatible*: For example, an emission limit may be incompatible with an emission tax if the flexibility to respond to the tax is compromised. Similarly, a negotiated agreement that sets fixed emission targets for a sector may be incompatible with an ETS, in that the flexibility to trade is circumscribed and abatement costs are increased.
- *Context specific*: In many cases, it may not be possible to state in the abstract whether the instrument combination will be positive or negative. Judgement will depend upon the detailed examination of the objectives and design of each instrument, together with the context in which they are being introduced. For example, a strict interpretation of the Best Available Technology (BAT) requirements for energy efficiency under IPPC would make it incompatible with emissions trading. But a different interpretation of BAT may allow these instruments to coexist - albeit with the flexibility of the trading scheme slightly compromised (Smith & Sorrell, 2001). In practice, a large number of instrument combinations may fall into this category.

Table 4.2, which is developed from Gunningham & Gabrosky (1998, p428), attempts to provide a broad brush indication of how different instrument categories may or may not work together. In practice, it is very difficult to fill out this table without specifying the individual instruments in more detail. For example, a trading system combined with a tax could be duplicative, but this mix could also be complementary if the instruments are offered to industry as alternatives. Similarly, two instruments may be in conflict if aimed at the same target, but could be complementary if aimed at two different, but related targets (e.g. industrial energy efficiency and the purchase of renewable electricity).

In many cases, the conflict will arise from competing policy objectives rather than any inherent incompatibilities between the instrument types. For example, the coexistence of subsidies for coal production with a downstream carbon tax. These instruments send conflicting messages to economic actors, reflecting a deeper conflict over policy objectives.

All this suggests that the analysis of potential interactions must go beyond broad categories and into the details of instrument objectives, design and context. A framework for such an analysis is developed in section 4.5. But first, a more general typology of policy interaction is proposed.

Table 4.2 Compatibility between different instrument categories

	Education & info	**Unilateral commitments**	**Public voluntary schemes**	**Negotiated agreements**	**Charge systems**	**Trading**	**Financial instruments**	**Framework standards**	**Performance standards**	**Technology standards**
Education & information	-	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Unilateral commitments	Positive	-	Contextual	Contextual	Contextual	Contextual	Positive	Positive if beyond compliance	Positive if beyond compliance	Negative
Public voluntary schemes	Positive	Contextual	-	Positive or duplicative	Positive	Positive	Positive	Positive	Positive	Negative
Negotiated agreements	Positive	Contextual	Positive or duplicative	-	Negative (positive if sequential)	Negative (positive if sequential)	Positive or duplicative	Positive if beyond compliance	Positive if beyond compliance	Negative
Charge systems	Positive	Contextual	Positive	Negative (positive if sequential)	-	Negative, unless alternative	Contextual	Contextual	Negative (positive if sequential)	Negative
Trading mechanisms	Positive	Contextual	Positive	Negative (positive if sequential)	Negative, unless alternative	-	Contextual	Contextual	Negative (positive if sequential)	Negative
Financial instruments	Positive	Positive	Positive	Positive or duplicative	Contextual	Contextual	-	Positive	Positive	Duplicative
Framework standards	Positive	Positive if beyond compliance	Positive	Positive if beyond compliance	Contextual	Contextual	Positive	-	Positive	Negative
Performance standards	Positive	Positive if beyond compliance	Positive	Positive if beyond compliance	Negative (positive if sequential)	Negative (positive if sequential)	Positive	Positive	-	Negative
Technology standards	Positive	Negative	Negative	Negative	Negative	Negative	Duplicative	Negative	Negative	-

Source: Based on Gunningham & Gabrosky, 1998, p428. Various changes have been made.

4.4 A typology of policy interaction

It is useful to distinguish five distinct types of interaction:

- *Direct interaction*: where the target groups directly affected by two policies overlap in some way;
- *Indirect interaction*: where either: a) the target group directly affected by one policy overlaps with the target group indirectly affected by a second (or vice versa); or b) the target group indirectly affected by one policy overlaps with the target group indirectly affected by a second;
- *Operational interaction*: where two policies operate together in that either: a) individual target groups (companies, installations, sources etc.) may move from one policy to the other under certain conditions; or b) the obligations and incentives imposed by one policy are deliberately modified as a result of the coexistence of a second policy.
- *Sequencing interaction*: where one policy which directly affects a target group is followed in time by a second policy which directly affects the same target group.
- *Trading interaction*: where two policies are linked by the exchange of an environmental trading commodity, such as a GHG emissions allowance.

These categories are not mutually exclusive, in that two policies may interact in more than one way. The following sections provide a brief summary of each type of interaction.

4.4.1 Direct interaction

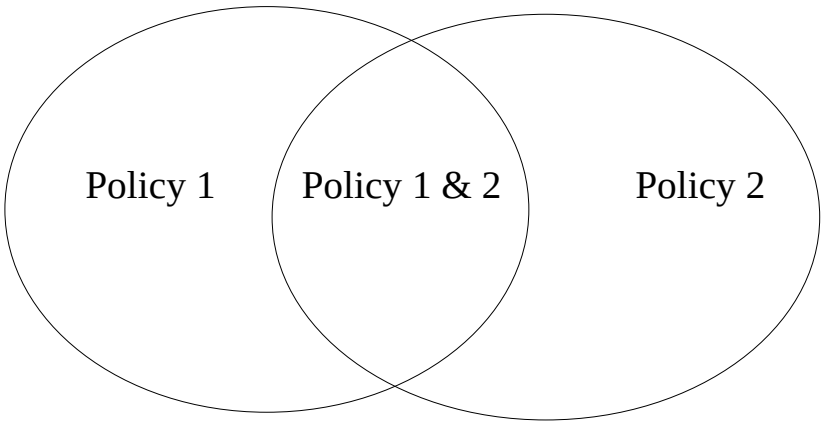
This is where the target groups directly affected by two policies overlap in some way (Figure 4.3). For example, some or all of the participants in a carbon ETS may already be subject to CO_2 emission limits or to a carbon tax on fuel use. Similarly, signatories to a negotiated agreement on energy efficiency may also be subject to the energy efficiency provisions of the IPPC directive.

Target groups, in this definition, refer to groups of economic actors that have control over the relevant economic activities. Direct interaction occurs when two policies simultaneously impose obligations and incentives on the same target group. This applies whether the policies address similar objectives (internal interaction) or different objectives (external interaction). So for example, an individual industrial site may be simultaneously subject to: a) a carbon tax; b) limits on combustion CO_2 emissions; c) limits on HCFC emissions; and d) limits on combustion SO_2 emissions. There is direct interaction between all of these policies. However, the interaction between the first three of these policies is internal to climate policy, while the interaction between policy (d) and each of the other three are external.

Policies (a), (b) and (d) all affect the same emission sources (although not necessarily the same pollutants), while policy (c) affects a different emission source. But compliance with any one of these policies may affect compliance with each of the others. For example: the CO_2 emission limit may restrict the flexibility to respond to the carbon tax and raise overall abatement costs; the limit on HCFC emissions may require the installation of abatement technology which in turn could raise energy use; and stringent restrictions on SO_2 emissions may lead to a switch from coal to gas and hence reduce combustion CO_2 emissions.

It is commonly the case that individual target groups are subject to multiple policies with multiple objectives, which derive in turn from multiple policy areas. Since every regulation entails opportunity costs, direct interaction is pervasive. But some interactions are far more important than others. In INTERACT, attention is confined to those internal interactions which are considered to be of particular economic significance. In the above example, this means the interaction between the carbon tax and the CO_2 emission limit. In contrast, the interaction between the carbon tax and HCFC emission limit is internal to climate policy but relatively unimportant, while the interaction between the carbon tax and the SO_2 emission limit is of economic significance, but external to climate policy.

Figure 4.3 Direct interaction



4.4.2 Indirect interaction

This occurs when a target group is indirectly affected by one policy and either directly or indirectly affected by a second. So, for example, there is indirect interaction between a downstream carbon ETS which includes the electricity generators and a tax on electricity at the point of consumption. Here, electricity consumers are indirectly affected by the trading scheme and directly affected by the tax. Similarly, there is indirect interaction between this type of trading scheme and obligations upon electricity supplies to purchase renewable electricity, since both will lead to higher prices for electricity consumers and lower emissions from electricity generators. Figures 4.4 to 4.7 illustrate different possibilities

Figure 4.4 Indirect interaction - 1

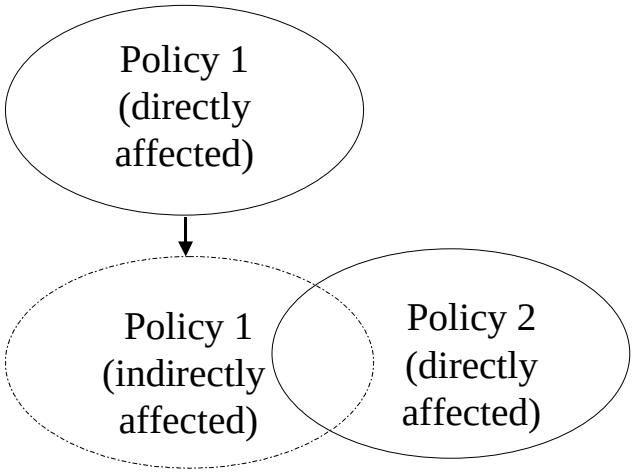


Figure 4.5 Indirect interaction - 2

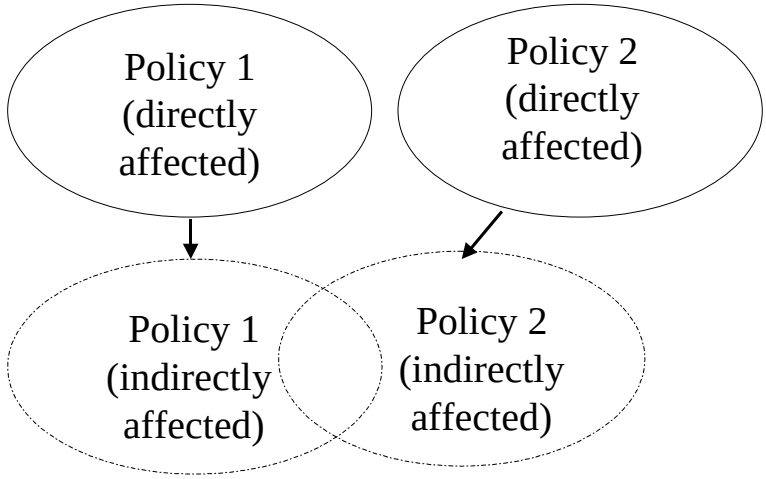


Figure 4.6 Indirect interaction - 3

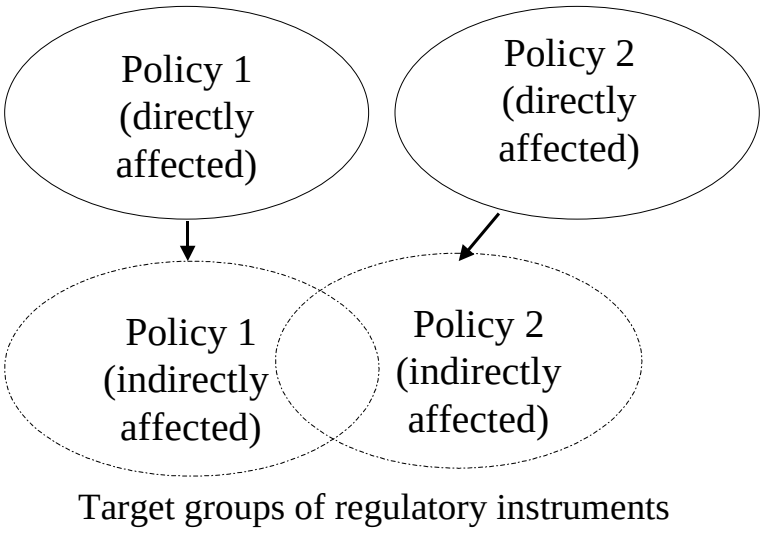
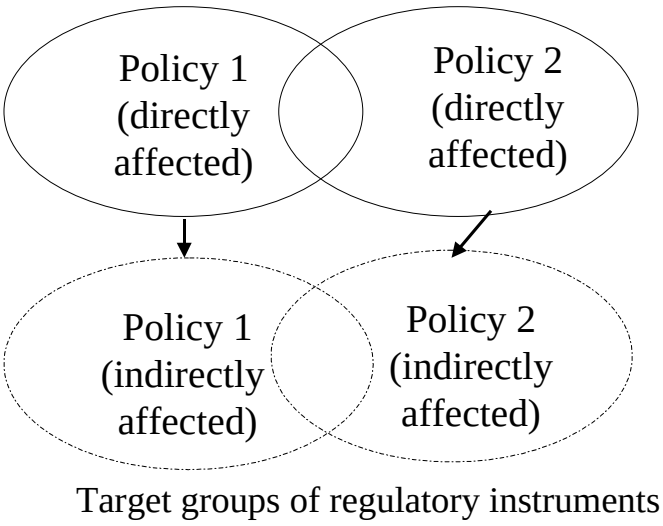


Figure 4.7 Direct and indirect interaction



The indirect effects of a policy permeate throughout the economy through a variety of routes and ultimately require analysis within a general equilibrium framework. For example, the

costs imposed by an environmental policy instrument on the business sector will be indirectly borne by consumers (through increased product prices), suppliers (through reductions in consumption or the price paid for supply inputs), and shareholders (through reduced dividends and capital gains). In each case, the extent to which costs can be passed on will depend upon the market situation of the affected firms and the elasticities of demand and supply in each market. It will also depend upon the timeframe under consideration and the extent to which firms have the opportunity to change behaviour and invest.

The pervasive nature of these impacts implies that the indirect interactions between policy instruments will be equally pervasive – and more so than direct interactions. Nevertheless, the concept of indirect interaction is still useful, provided we confine attention to those interactions which are both internal to climate policy and of particular economic significance. The first order impacts of environmental regulations on product markets will frequently fall into this category. For example, if the electricity generators are participating in an ETS, the indirect impacts of the ETS upon electricity consumers becomes of particular interest. This is because, first, the economic implications of carbon controls on electricity emissions (and hence electricity prices) are potentially very large; and second, electricity consumers are typically subject to a wide range of other climate policies that will interact with the trading scheme.

4.4.3 Operational interaction

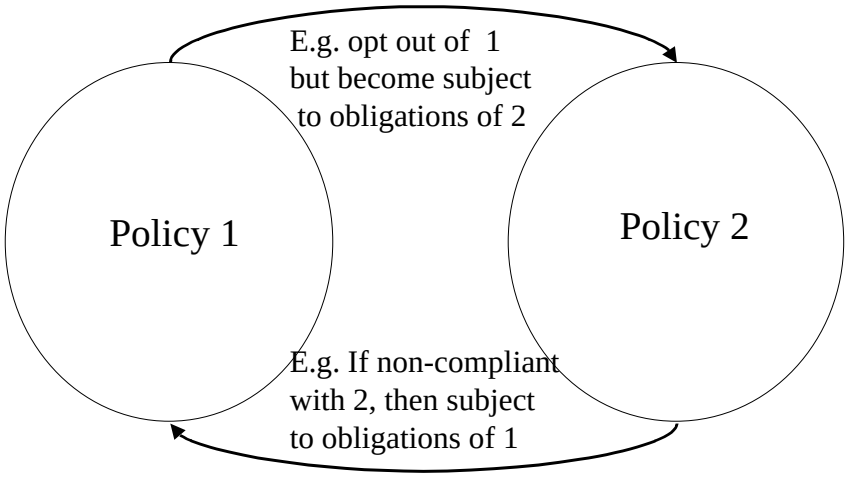
In this case, two policies may not overlap in the target groups that they directly or indirectly affect. But they operate together in that:

a. directly affected economic actors, groups of actors or the entire target group may move from one policy to the other under certain conditions; or
b. the obligations and incentives directly imposed upon some or all of a target group by one policy are deliberately modified as a result of the coexistence of obligations and incentives directly imposed by a second policy.

In the case of (a), the movement from one policy to a second may be voluntarily chosen, or it may be imposed by a regulator. For example, a company may voluntarily enter into a negotiated agreement in order to avoid paying a carbon tax, but it may be required to pay the full rate of the tax if it fails to meet its negotiated agreement targets. Instrument combinations such as these may sometimes be classified as policy packages or hybrids rather than separate instruments and are analogous to the use of penalty provisions for non-compliance within individual instruments. In the case of emissions trading, provisions that allow companies to opt-out of or opt-in to the trading scheme will fall within this category. The instrument pyramid described by Gunningham & Gabrosky (1998) is an example of this form of interaction.

In the case of (b), the provisions for modifying the obligations and incentives of a policy may have been included as part of an integrated policy package, or may have been added retrospectively as the result of the introduction of a second policy. For example, proposals for ‘regulatory relief’ for companies which are participating in the European Eco Management and Audit Scheme (EMAS) fall into this category (Wätzold et al, 2001), as does the proposed relaxation of the energy efficiency provisions of the IPPC Directive for installations that are participating in the EU ETS (KOKO).

Figure 4.8 Operational interaction – type a

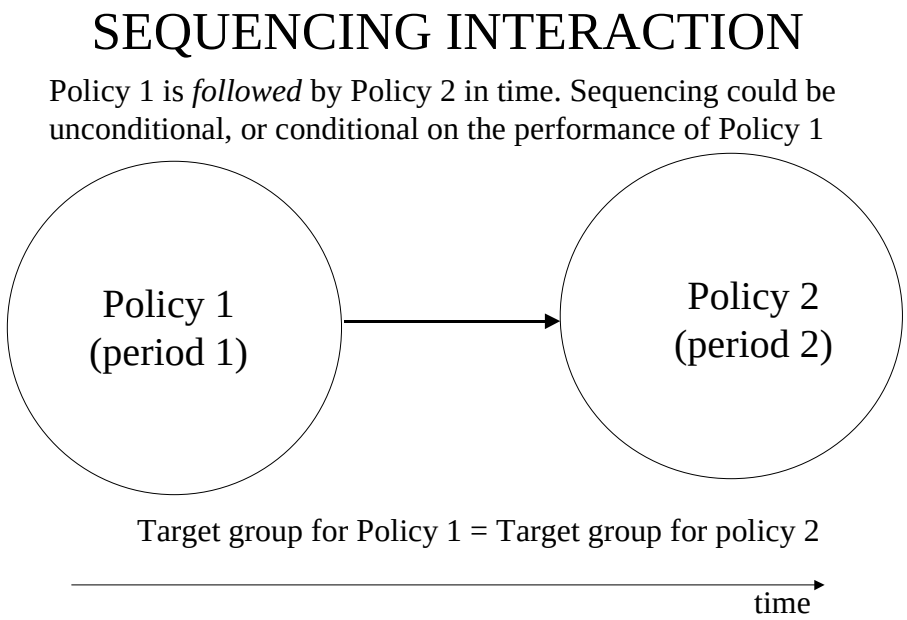


4.4.4 Sequencing interaction:

This differs from the operational interaction in that the two policies follow each other in time, rather than coexist. This sequencing may be unconditional, with one policy replacing another, or conditional, with the second policy only being introduced if the first fails.

An example of unconditional sequencing is where direct regulations or negotiated agreement targets form the basis of allowance allocation under an ETS - an approach which could be valuable in facilitating the incremental introduction of a trading scheme into the existing policy mix (Smith, 1999). An example of conditional sequencing is the use of voluntary agreements on GHG emissions, with the implicit or explicit understanding that if the targets are not met a more interventionist measure such as a carbon tax will be introduced. The effectiveness of this approach depends upon both the stringency of the 'back-up' instrument and the amount of discretion that is associated with its implementation. For example, a mandatory switch to existing carbon tax will be more effective than a vaguely defined threat to introduce a carbon tax through new legislation, since the latter will depend upon decisions by subsequent administrations.

Figure 4.9 Sequencing interaction

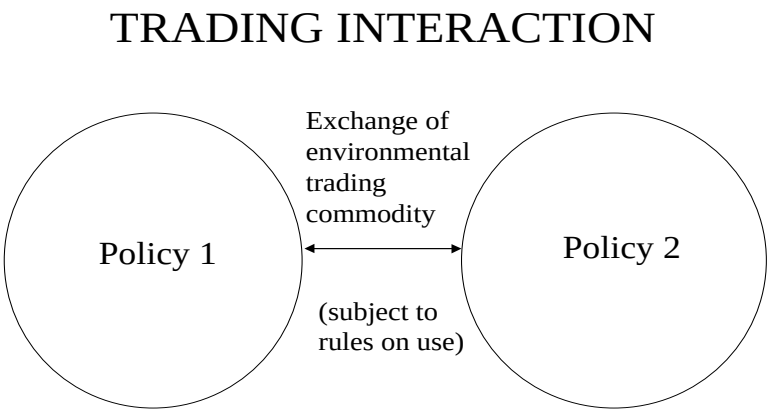


4.4.5 Trading interaction

This is where two policies influence one another by the exchange of an environmental trading commodity – where the commodity has been created by one or other policy (e.g. a GHG emissions allowance)[2]. For example, carbon allowances from a trading scheme in one country may be exchangeable for allowances from a trading scheme in a second. Any such links would need to be governed by transfer and exchange rules, which in combination would define the *fungibility* of the different commodities. For example, trading may only be allowed in one direction, there may be restrictions on the quantity or type of allowances that can be traded, or there may not be a one-to-one equivalence between the allowances in each scheme. These rules will determine both the scope for trading and the economic and environmental consequences of trading. Trading interactions between the Kyoto mechanisms and national and international GHG trading schemes are becoming a critical issue as the Kyoto regime develops and have important implications for abatement costs and environmental integrity (Haites and Mullins, 2001).

[2] This is distinct from conventional forms of market links - such as buyers and sellers of goods.

Figure 4.10 Trading interaction



For trading interaction to occur one or both policies must be trading based. For example, a negotiated agreement could interact with a domestic ETS if allowances from the latter can be used for compliance with the former. In addition, the parallel development of schemes such as tradable green credits for renewable electricity opens up the additional possibility of linking schemes where the tradable commodities have different denominations (e.g. MWh and tCO_2 respectively) (Morthorst, 2001; Sorrell, 2003b). This is possible because the tradable commodities in such schemes represent, in part, displaced carbon emissions and hence can be converted to tonnes of CO_2 by means of a suitable exchange rate. Table 4.3 summarises the different possible combinations.

Table 4.3 Types of trading interaction

Policy 1	**Policy 2**
Trading based (GHG emissions commodity)	Trading based (GHG emissions commodity)
Trading based (GHG emissions commodity)	Trading based (other environmental commodity)
Trading based (GHG emissions commodity)	Non-trading
Trading based (other environmental commodity)[1]	Non-trading
Trading based (other environmental commodity)	Trading based (other environmental commodity)

Note: Other environmental commodity must represent, in part, displaced GHG emissions - such as MWh of renewable electricity.

Trading interaction may be considered as a special type of indirect interaction, where the target group directly affected by one policy is indirectly affected by a second through the trading links – and vice versa. But the importance of this form of interaction for climate policy justifies classifying it as a separate category.

4.4.6 Summary of interaction typology

In most OECD countries, the existing climate policy mix contains a series of examples of the above categories of interaction. If a GHG ETS is introduced into this mix, the number of interactions can be expected to multiply.

Each type of interaction may have implications for abatement costs, administrative costs, environmental effectiveness, equity and political feasibility. Furthermore, each type of interaction may lead to differential treatment, with some target groups being affected by both instruments and some by only one. Hence, the extent to which such interactions can be judged as beneficial, neutral or counterproductive requires a careful examination of the nature and consequences of the interaction and an evaluation of those consequences within a multicriteria framework. This should lead to a judgement as to whether the combination of instruments is useful, redundant or positively harmful.

This type of analysis goes well beyond the simple 'compatibility' matrix developed by Gunningham and Gabrosky (Table 4.2). Instead, it requires a systematic approach to examining the nature and consequences of policy interaction within specific situations. A framework for such an approach, adopted for the INTERACT project, is provided in the next section.

4.5 Analysing policy interaction

4.5.1 Process for studying interaction

The analysis of policy interaction involves

- identifying how and why the two policies affect each other;
- identifying the consequences of this, for the target groups, the organisations involved in implementation and the attainment of the policy objectives; and
- evaluating the desirability of these consequences against chosen evaluation criteria.

As an example, take the interaction between the UK negotiated agreements with energy intensive industry (termed Climate Change Agreements, or CCAs) and the UK Emissions Trading Scheme (UK ETS):

- CCA companies are allowed to trade GHG allowances with the 'direct participant' sector of the UK ETS, subject to a number of restrictions. It is likely that the marginal abatement costs in the CCA sector will be higher than in the direct participant sector. Assuming cost minimising behaviour, one likely result is that there will be a net transfer of allowances from the direct participant sector to the CCA sector.
- The consequences of this, compared to a situation where there is no trading between the two sectors, include:
    - an increase in demand for allowances from the direct participant sector, and a consequent increase in allowance prices in that sector;
    - an increased supply of allowances in the CCA sector, and a consequent decrease in allowance prices in that sector;
    - a reduction in overall compliance cost for CCA companies;
    - a reduction in revenue for sellers of allowances located in the CCA sector; and

    - an increase in emissions from the UK ETS as a whole.
- The desirability of these consequences may then be evaluated according to broad criteria such as economic efficiency and environmental effectiveness. For example, abatement costs could be reduced but the environmental effectiveness of the policy mix may be undermined. The overall evaluation will depend upon both the estimated impact of the interaction, and on the relative weighting given to each of the evaluation criteria.

The analysis of the mechanisms and consequences of interaction is separate from the evaluation of the desirability of these consequences. With adequate information and formal modelling tools, the implications of policy interaction could be explored quantitatively. But within the INTERACT project, the exploration is largely qualitative.

It is simplest to examine the interaction between *two* selected instruments, although multi instrument mixes will also exist. The two instruments may be either existing or proposed and may be specified to varying levels of detail. The interaction analysis is used to identify possible conflicts between these instruments, and to identify actual or potential synergies. The analysis of interaction involves a systematic comparison of:

- the scope of the instruments;
- the nature of the objectives;
- the timetable of the instruments.
- the operation of instruments; and
- the process of implementation.

The following sections discuss each stage of this process in more detail.

4.5.3 The scope of the instruments

The first stage the process is to define the scope of each instrument and the overlaps between them. Scope may be defined as the target groups directly and indirectly affected by the instrument. Since our primary interest is the EU ETS, the direct target groups include electricity generators, oil refineries and energy intensive industry, while the indirectly affected groups include the consumers of the products of these industries.

As described in section 3.2, direct target groups are defined as the economic actors that have control over the relevant economic activity. These will typically be defined by:

- economic sector and subsector;
- individual organisations within each sector,
- individual sites within each organisation (e.g. by annual energy consumption); and
- relevant exemptions and special provisions (e.g. the exclusion of charities from a carbon tax).

We are also interested in the definition of the activities themselves. This includes:

- the technical nature of the activity (e.g. process plant versus combustion plant);
- the individual emission sources within each activity; and

- the individual pollutants from each emission source.

Established policies will include detailed definitions of which groups and activities are directly affected. Many policies will be introduced in stages, so these rules will be linked to a timetable. Also, the definitions may include rules on how to handle changes in the direct target group, such as mergers, acquisitions, transfers and closures

The identification of the indirectly affected target groups is much less straightforward since indirect impacts permeate throughout the economy through a wide range of mechanisms. But in INTERACT we focus solely on those groups which bear the greatest economic impacts. In the case of the EU ETS, the indirect target group that is of greatest interest is electricity consumers.

The target groups that are directly or indirectly affected by two policies may overlap. The pattern of overlap may change with time as policies are introduced, removed or modified, or as a result of phased implementation of a policy. Hence, the first stage of an interaction analysis is to identify who the direct and indirect target groups are for each instrument, and where, when and how they overlap.

Given the complexity of individual policy instruments, this may be far from straightforward. For example, both the EU ETS and the UK CCAs target energy intensive industry. But there are considerable differences in terms of the coverage of individual sectors, sites, portions of sites, fuels, emission sources and greenhouse gases (section 6). These in turn create a complex set of boundary issues, which may increase administrative costs and introduce distortions to competition.

4.5.4 The nature of the objectives

The second stage of the process is to identify and compare the objectives of each instrument. Policy objectives refer to desired policy outcomes. Typically, policies will have multiple objectives, and when in operation policies will have multiple outcomes. Outcomes are the result of a complex chain of processes involving both directly and indirectly affected target groups and policy objectives may refer to outcomes at any point along this chain. While objectives are sometimes expressed with reference to theories of market or government failure (e.g. externalities), they are more usually expressed in less formal terms (although these may often be reinterpreted within a more formal framework). Similarly, while objectives are often explicit in policy documents, there may also be hidden objectives which influence policy design and reflect competing political agendas.

The policy objectives of two interacting instruments may be compared to identify their degree of compatibility. The objectives of two climate policy instruments should be broadly compatible as they aim ultimately at the reduction of GHG emissions. But more detailed examination may reveal conflicts. For example, a policy to reduce industrial emissions of SF_6 may be likely to lead to increased energy use and hence CO_2 emissions. Similarly, a policy to encourage CHP would reduce overall CO_2 emissions, but increase emissions from the host site. This may conflict with another policy which is targeted solely at emissions from industrial fuel use.

Incompatibility is more likely with external interaction as two policies may address entirely separate problem areas (e.g. free trade and environmental protection). But individual policies

within climate policy may also have objectives unrelated to reducing GHG emissions, such as overcoming fuel poverty. In the case of the latter, for example, it is widely recognised that improving the energy efficiency of the UK housing stock is likely to result in increased emissions as householders improve the comfort level of their homes (e.g. through heating every room). Similarly, policies such as carbon taxes can be regressive without explicit compensation.

The degree of compatibility of policy objectives maybe considered as lying on a spectrum, from direct conflict to mutual reinforcement. For example:

- Two objectives may be in *conflict* if the achievement of one objective would undermine the achievement of another. There are differing degrees of incompatibility, and it is a matter of judgement as to how important the conflict is. An example of policies which are clearly incompatible would be the coexistence of subsidies for the clearance of forested areas with policies to develop carbon sinks. At the other extreme, achievement of one objective may merely frustrate or slow down the achievement of another. For example, the objective of ensuring equal treatment between different firms may conflict with the objective of confining derogations to a carbon tax to energy intensive industry alone. Such partial conflict is likely to be common.
- Two objectives may be *neutral* if the achievement of one objective would have no or minimal effect on the achievement of the second. An example is where the two instruments target different environmental objectives, and where the changes required of the target group(s) to meet these objectives are unlikely to interact. One difficulty with climate policy is that energy use is implicated in practically all economic activities. This means that, first, climate policy is very likely to impinge on the achievement of other policy objectives; and second, other policy objectives are very likely to have implications for climate policy. So, for example, policies to improve air quality by reducing the sulphur content of fuel will lead to increased energy use and hence increased CO_2 emissions from oil refineries. Neutral interactions between climate policy and other policy areas may therefore be relatively rare.
- Two policies may be *reinforcing* if the achievement of one objective would reinforce the achievement of another. Two instruments that aim to reduce CO_2 emissions from a particular target group may be considered *duplicative* if one instrument is largely redundant, or *complementary* if the combined effect is likely to be greater than the effect of either instrument acting alone. To assess this, it is necessary to examine the obligations and incentives imposed by each instrument.

In studying policy interaction, the individual objectives of each policy need first to be identified. This may not be straightforward, since some objectives maybe implicit or hidden. Pairs of objectives should then be compared to identify their degree of compatibility. Since each policy instrument may have more than one objective, this implies a number of paired comparisons. When this is complete, a judgement may be made on the nature and importance of the conflicts and the extent of compatibility between the objectives. Note that a judgement about the compatibility of objectives is separate from a judgement about the desirability of those objectives, since this forms part of the evaluation process.

Identification of policy objectives is particularly important for instruments which interact with a cap & trade ETS since, once in place, the level of aggregate emissions is set by the overall cap. As a result, instruments which directly or indirectly interact with the trading

scheme will contribute nothing further to emission reduction, unless they are sufficiently stringent that they make the overall cap redundant. This means that the justification for such instruments can no longer rely on their contribution to aggregate emission reductions and must rely instead on their contribution to wider policy objectives. This important result is discussed further in section 5.

4.5.5 The operation of the instruments

The third stage of the process is to explore the aggregate impact of the two instruments on the target groups. Policies impose obligations and incentives upon the directly affected target group(s), and/or enhance the capacity of the group(s) to take some desired action. The behavioural changes made by the target group in response to the policy will correspondingly influence other target groups - notably through increases in product prices.

For target groups that are directly affected by two policy instruments, the obligations and incentives will overlap. In some cases, they will reinforce each other, while in other cases they will conflict. In general, there are three approaches to assessing the aggregate effects of the two policies.

The first option is to estimate the response of the directly affected target groups quantitatively, together with the impact of this response on indirectly affected groups. This requires: a) a set of behavioural assumptions; b) information on the relevant characteristics of the affected target groups (e.g. price elasticities); c) information on the policies themselves; and d) appropriate economic modelling tools. For example, a linear programming model may be used to estimate the combined impact of a carbon tax and limits on SO_2 emissions on the pattern of electricity generation from a group of power stations, together with the resulting increase in electricity prices. While a partial equilibrium model could be used to assess the direct impacts, a general equilibrium approach is required to fully assess indirect impacts. In practice, however, the available information may be inadequate, appropriate modelling tools may not be available and the individual policies may not lend themselves to quantitative modelling.

The second option is to develop a theoretical model to explore the incentives faced by the directly affected target groups. This would normally take the form of maximising some objective function (e.g. profits) subject to constraints, where the obligations and incentives provided by each policy form part of the constraints. Examples of this approach are provided in the UK case study for INTERACT, which explores the coexistence of absolute targets on GHG emissions from the EU ETS with targets on energy use per unit of output from the UK negotiated agreements (Sorrell, 2002). The results illustrate how theoretical models can provide valuable insights into the incentives faced by the target group. However, many policies will not lend themselves to such formal modelling.

The final option is to explore the combined impact of the two policies qualitatively. The key judgements to be made here are the relative size and importance of each of the obligations and incentives, the likely response of the target groups to these, and the extent to which particular obligations and incentives will dominate. This leads to a judgement on the extent to which two policies may be considered compatible. As with policy objectives, the degree of compatibility can be considered as lying on a spectrum, from direct conflict to mutual reinforcement:

- *Counterproductive:* Here, the obligations and incentives created by one instrument are undermined to a greater or lesser extent by those created by a second. The relative strength of the incentives will determine which ones take precedence. For example, the mandatory requirement on oil refineries to meet fuel quality standards will take precedence over government exhortations to improve energy efficiency. A particularly important example is where instruments with a high degree of prescription (e.g. emission limits) undermine the flexibility offered by co-existing instruments with a low degree of prescription (e.g. carbon taxes). Note that this is a conflict of obligations and incentives, not of policy objectives.
- *Neutral:* Here, the obligations and incentives created by one instrument have no or minimal effect on the obligations and incentives created by another. For example, legal requirements (backed with sanctions) to report HCFC emissions should operate fairly independently of the incentives created by an energy tax to improve energy efficiency. However, since all actions imply opportunity costs, no two policies can be considered entirely neutral. Indeed, the cumulative burden of increasing numbers of regulatory measures is a common focus of complaint.
- *Duplicative*: Here, two instruments encourage similar changes by the target group, but one instrument acting alone is considered to be adequate to achieve the desired objectives. This may be the case, for example, where a mandatory requirement (backed with sanctions) to adopt a particular energy efficient technology (e.g. high frequency fluorescents) is combined with financial subsidies to retrofit that technology. In this case, the financial subsidy becomes redundant.
- *Complementary:* Here, two instruments encourage similar changes by the target group, but the net effect of the combination of policies is considered to be greater than either instrument acting alone. This is most likely to occur when two instruments target different aspects of a common problem. For example, public voluntary schemes can be complementary to an energy tax in encouraging improved energy efficiency. In this case, while the tax raises energy prices and thereby increases the viability of energy saving measures, energy remains a very minor proportion of total costs and is likely to be overlooked. In such a situation, signing up to a public voluntary scheme may provide the additional incentive necessary to identify cost saving opportunities.

4.5.6 The mechanisms for implementation

The fourth stage of the process is to examine how the instruments will be implemented. Each instrument will impose a range of administrative obligations on the target group, including emissions monitoring and reporting. Similarly, each instrument will impose a range of obligations on the network of first, second and third parties responsible for implementation, including verification, accreditation, technical inspections, enforcement of non-compliance and so on. It is necessary to analyse the nature of the obligations imposed by each instrument on each of these organisations and to identify the overlaps. For example, an environmental regulator may be involved in implementing IPPC, but may also be involved in implementing an ETS. The pattern of overlap may change with time as policies are introduced, removed or modified, or as a result of phased implementation.

For the parties involved in both policies, it is necessary to explore the extent to which the obligations imposed by each policy are compatible. This involves a comparison of the relevant obligations, particularly those relating to monitoring and verification. As before, the degree of compatibility may be considered as lying on a spectrum, from direct conflict to

mutual reinforcement. In practice, however, the most likely occurrence is for there to be some degree of *duplication*. For example, the monitoring and reporting of CO_2 emissions may be required under emissions trading, negotiated agreements and accredited environmental management schemes. Duplication in reporting requirements leads to unnecessary costs for the target group. However, there may be differences in the scope, frequency and accuracy of the reporting requirements, or in the methods for verification. The requirements under one policy (e.g. IPPC) may not be accurate enough for use in a second (e.g. emissions trading). The key question, therefore, is whether there is any unnecessary duplication in functions and whether there is scope for the rationalisation and harmonisation of the different obligations.

For parties involved in implementing only one policy, there should be no direct conflict with the implementation of the second policy. However, parties may be performing functions for one policy which parallel those performed by different parties implementing the second policy. For example, companies accredited to an environmental management scheme may require verification of emissions data as part of the accreditation process, while the same company may require verification of CO_2 emissions for participation in a trading scheme. Verification for the management scheme may be conducted by an environmental audit company, while that for the trading scheme may be conducted by an environmental regulator. Similarly, the government may be developing a registry for an ETS (to track allowance allocations, trades and retirals) while the same time developing a separate registry for a tradable green certificate scheme for renewable electricity. The similarity between the two functions suggests that there may be administrative savings to be made in combining them in a single body. As before, therefore, the key question therefore is whether there is any unnecessary duplication in functions, and hence scope for rationalisation and harmonisation.

4.5.7 The timetable of the policy instruments

The final stage of the process is to examine and compare the timetable of each instrument. Timetables should specify one or more of the following:

- when the instrument is to be introduced;
- when changes are planned in the operation of the instrument;
- when the instrument is to be removed;
- how different trigger mechanisms will change the operation of the instrument; and
- how the instrument will respond to dynamic changes in the target group(s).

All instrument designs will include a date for introduction, and many will include plans for phased implementation, with the rules and influencing mechanisms changing over time. For example, a trading scheme may begin with the very largest emitters and then expand at a later date to include smaller emitters. Or a tax may be planned to increase in annual increments. It is less common for instruments to have a fixed date for their removal. More often, the lifetime of the instrument is indefinite and hence subject to later review.

As well as planned changes at particular intervals of time, the design may allow the instrument to be changed in response to *triggers*. These triggers may derive from changes in the target group(s) or changes in the wider environment. For example, the level of a carbon tax may be tied to the emission reductions that have been achieved by the target group(s), or the level of an energy tax may be linked to underlying changes in fuel prices.

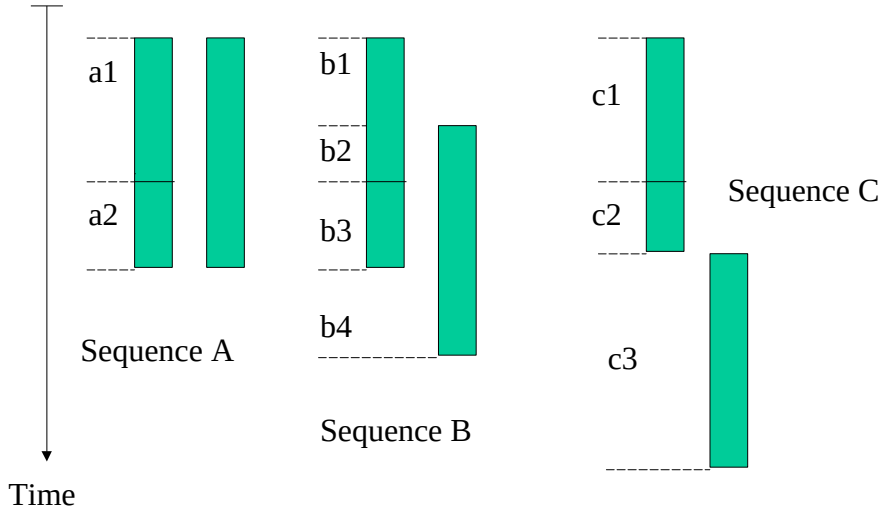
One possibility is for the trigger to lead to the removal of the existing instrument and its replacement with another. For example, failure of an organisation to meet a negotiated agreement target could lead to its replacement with a carbon tax. This is an example of *sequencing interaction*, introduced in section 4.4.4. To respond to such triggers, it is necessary to establish suitable monitoring mechanisms.

An important aspect of the timetable of policy instruments is the tension between the predictability of regulation versus the ability to adjust or fine tune the policy in the light of experience. To be effective, instruments such as negotiated agreements and trading schemes require predictability - the target should remain unchanged for an agreed period of time. Without this, industry will complain of regulatory uncertainty and participants in a trading scheme will be dissuaded from trade. At the same time it is desirable to have regular reviews of policies, to allow for the adjustment of targets in the light of scientific evidence, international obligations, technical change and other factors. There is a conflict between these two objectives. A possible quid pro quo would be for longer term predictability to be predicated upon tougher, more challenging targets.

These considerations will affect the analysis of policy interaction. Figure 4.11 shows three possibilities for the timetable of two instruments which affect a common target group(s). The first instrument of the pair is introduced in two stages as indicated by the line. The analysis of interaction must consider each of the time intervals (a1, c1 etc.) separately.

In sequence C there is no direct interaction, but the instruments are sequenced. If the first instrument is a tax and the second a trading scheme, we may conclude that sequences A and B are unacceptable due to counterproductive interaction. But sequence C may be considered viable. Such sequencing may occur at a planned interval or be initiated by a trigger. The design of such a sequence may be essential to the success of the first policy instrument. For example, the success of a negotiated agreement may depend upon the threatened imposition of a stringent tax if the targets are not met.

Figure 4.11 Policy sequencing



The design process for a policy instrument is also linked to a timetable. Decisions on the design and implementation of different policy instruments will necessarily be made at different times. This creates two related risks:

- decisions over earlier policy instruments could obstruct the design and implementation of subsequent instruments, or undermine their flexibility; and
- assessments under later policy instruments may undermine the legitimacy of earlier decisions.

Climate policy is being developed in the context of considerable uncertainty, with evolving negotiations on the Kyoto Protocol, EU climate policy and Member State climate policy. This means, for example, that some decisions on Member State climate policy have been and will be made before the details of either the Kyoto mechanisms or the EU trading scheme are agreed. This is the primary reason for many of the conflicts studied in the INTERACT project.

4.5.8 Analysing policy interaction in INTERACT

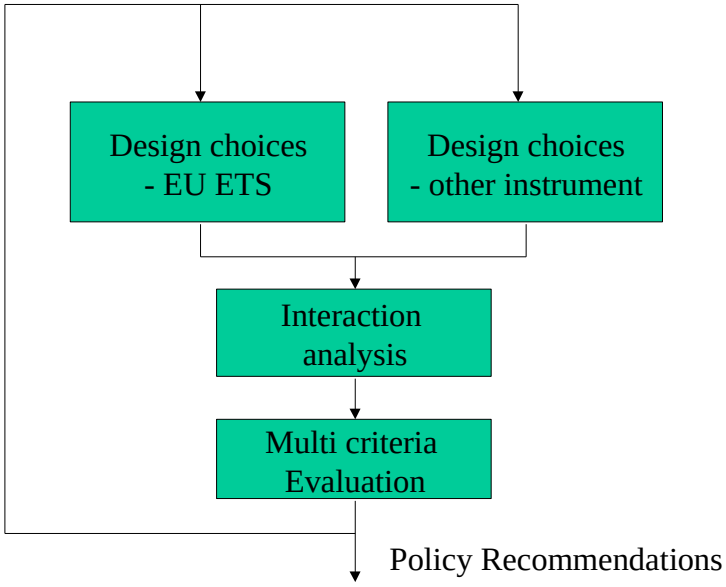
In INTERACT, the above process is repeated several times for a number of policy pairs. In each case the first policy is the EU ETS, while the second is a climate policy instrument at the EU or Member State level. For each of these policy pairs, the interaction analysis is applied in an iterative manner (Figure 4.12), with the objective of developing and recommending an improved policy mix. The basic questions are:

- How can other climate policy instruments can be designed, implemented or modified to facilitate the introduction of the EU ETS?

- How can the EU ETS be designed and implemented so that it builds upon, and works in harmony with, existing policy instruments?

In practice, emphasis was given to modifying the design or implementation of national policy instruments, since the design of the EU ETS became increasingly fixed during the course of the project.

Figure 4.12 Studying policy interaction



The procedure is as follows. First the interaction between the EU ETS and a second climate policy instrument is analysed, *assuming that the latter remains unchanged*. In practice, it may be unlikely that the second instrument remains unchanged following the introduction of the EU ETS, but the assumption that it does provides a useful benchmark for evaluating policy options.

Multi-criteria analysis is then used to evaluate the performance of the instrument pair against the criteria set out in Box 3.2. On this basis, a number of policy options are developed, with the aim of improving the performance of the policy pair against one or more of the criteria. An option may involve modifying one or both of the original policies, either to avoid negative interaction between them or to encourage complementary interaction. It may also involve replacing the second instrument. To demonstrate the range of alternatives available, the options should be quite different from each other and confined to changes in basic (rather than detailed) design features. The options must also be consistent with the constraints provided by *other* Member State and EU policies, such as a state aid rules.

Once an option has been chosen, the interaction methodology is repeated to analyse the nature of the interaction between the modified policy instruments. As before, the aim is to identify how and why the two policies affect each other, and to assess the consequences of this for directly and indirectly affected target groups. Multi-criteria analysis is again used to evaluate the performance of the two instruments, with the aim of assessing:

- whether the proposed modification is likely to change the evaluation under any objective;
- whether it makes the evaluation better or worse; and
- whether anything can be said about the size of the change (e.g. marginal or very large).

The goal in developing these options is not to design an 'optimal' policy mix. Instead, it is to explore the nature of the issues that arise, and to identify ways in which conflicts can be avoided and synergies created. The process does, however, lead to a series of recommendations for EU and Member State climate policy.

The results of this analysis are described in detail in each of the Member State reports and summarised in sections 6 to 10 of this report.

4.6 Challenging policy interaction

Policy interaction may lead to either additional costs for affected target groups or differential treatment of target groups. As a result, the existence or design of the relevant policies may become a focus of complaint, with lobby groups opposing what they perceive as 'double regulation' and/or 'differential treatment'. These issues are explored below.

4.6.1 Double regulation

Double regulation may be loosely defined as: 'a situation where an individual target group is directly or indirectly affected by two or more instruments that have very similar objectives.'

The term suggests that there is redundancy in the policy mix and that having two or more instruments operating together to achieve a similar objective is unnecessary and is leading to excessive costs. An example could be where a participant in a carbon ETS is also subject to an energy or carbon tax, where both instruments have the primary objective of reducing CO_2 emissions.

The European Commission, in the development of the European Climate Change Programme (ECCP), has stated that is wishes to '...set up a coherent and co-ordinated framework of policy instruments, avoiding double or multiple regulation…..' (CEC, 2001). Unfortunately, the ECCP does not consider policy interaction in a systematic way and instead simply lists the policies it would like in addition to the EU ETS.

'Double regulation' is a negative term, but some forms of double regulation may be acceptable to the parties involved. For example, compliance with the UK Renewables Obligation in 2010 is expected to lead to an average electricity price increase for all types of consumer of 4.4% compared to 1999. At the same time, many of these consumers will be paying an energy tax on electricity consumption, which leads to an average 13.7% increase in electricity prices above 2001 levels for industrial consumers (3.14p/kWh). Taking both instruments together, the total increase in electricity prices for industrial consumers is likely to exceed 15%. Since both the CCL and the Renewables Obligation have a primary objective of reducing CO_2 emissions, this could be viewed negatively as double regulation of electricity consumers. But in practice, this has not been the case. The coexistence of these two measures has proved broadly acceptable for two reasons:

- *Multiple objectives*: Each instrument has multiple objectives, and the full set of objectives could not be achieved by either instrument acting alone. For example, the objectives of the Renewables Obligation include encouraging the innovation and diffusion of renewable energy technologies, reducing technology costs, improving energy security and ameliorating conventional pollution problems such as acid rain. Reducing carbon emissions is only one objective and while the Renewables Obligation aims to encourage economic efficiency in renewables deployment, it recognises that renewable energy does not offer the lowest cost carbon abatement option in the short-term. Government support of renewable electricity is justified by these wider policy objectives and the acceptance of the Obligation suggests that these objectives have legitimacy.
- *Reinforcing incentives*: The net effect on the attainment of individual objectives of the two instruments acting together may be greater than either instrument acting alone. For example, electricity from 'new renewable' sources is exempt from the energy tax, and this acts as an important demand side boost to renewables to complement the supply side obligation on electricity suppliers. The net result should be faster, greater or lower cost deployment of renewables than would have been achieved by the Obligation acting alone.

The term 'double regulation' therefore oversimplifies a complex reality. There may be many instances where double regulation is either acceptable or positively beneficial. To assess whether this is the case it is necessary to conduct a full analysis of the nature, rationale and consequences of interaction using the methodology described above, together with a multicriteria evaluation of those consequences against an agreed (and weighted) set of evaluation criteria. In particular, it is important to closely examine the objectives of each instrument, the clarity, transparency and legitimacy of these objectives, and the degree of overlap between them The goal is not to avoid 'double regulation', but to determine the circumstances in which interaction between two policies is either acceptable or unacceptable.

4.6.2 Differential treatment

Differential treatment arises when the obligations, incentives or costs imposed upon one target group differ substantially from those imposed upon a second target group. This may give rise to distributional concerns and/or undermine industrial competitiveness. The latter is frequently an issue in the design of individual climate policies and results from differential treatment:

- between individual companies affected to different degrees by a particular policy;
- between companies affected by a policy and those not affected within the same country;
- between companies affected by a policy and companies in other countries which may be either unregulated or subject to different policies.

Policy interaction complicates this further since some target groups will be affected by two policies while some will only be affected by one.

From the competition perspective, differential treatment is only relevant to competitor companies. So, for example, the fact that carbon emissions from the UK brewing industry are regulated more strictly than carbon emissions from the UK mechanical engineering industry should not be of concern. Similarly, the importance of differential treatment will depend upon the extent to which the sector or companies are exposed to international competition. The

Dutch proposals for a national ETS make a distinction between sheltered and exposed sectors, with the latter defined as having exports exceeding 15% of domestic production or competing imports exceeding 15% of domestic demand (Dutch CO_2 Trading Commission, 2002). In practice, exposure to international competition is a matter of degree. In addition, the impact of a policy on a sector's competitiveness will depend upon (Ekins and Speck, 1998):

- the nature, form and stringency of the policy;
- the speed of introduction of the policy;[3]
- the energy or carbon intensity of the sector's product and the scope for substitution towards products with a lower environmental impact;
- the opportunities available for improving energy efficiency; and
- the scope for technological innovation.

There are three grounds on which differential treatment could be a concern. First differential treatment may be subject to *legal* challenge under competition law at the national, EU and international (WTO) level. In this context, the EU internal market and associated state aid regulations are of particular importance. The political debate on the EU ETS has centred around the balance between harmonisation and subsidiarity and similar conflicts can be anticipated in the development of rules for allowance allocation (CEC, 2000b; Egenhofer and Mullins, 2000). Article 87(1) on state aid in the EC Treaty states that:

> '… any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the common market.'

This state aid rules are complicated by certain exemptions, including those for environmental protection (OJ, 2001) and require legal interpretation in individual cases. Also, the rules refer to the *explicit* provision of resources to companies, and do not cover the exemption of firms or sectors from emission reduction requirements where these are not mandatory under EU law. Similarly, national regulations that *disadvantage* (as opposed to advantage) a Member State company compared to companies in other Member States would not be incompatible with state aid rules.

Differential treatment may also be challenged on *political* grounds if it is seen to be 'unfair'. Political objections may carry weight even where competition law is not violated. The validity of such arguments is typically the subject of intense debate and it should be recognised that individual policies may damage the competitiveness of individual sectors while having a beneficial effect on the competitiveness of the economy as a whole.

Finally, differential treatment may be challenged on *environmental* grounds if it appears to create a risk that pollution will be displaced from one sector to another, one country to another, or one type of installation to another. Empirical evidence suggests that investment decisions are overwhelmingly driven by factors other than environmental compliance costs, so this concern may be overstated (Jaffe et al 1995). However, since the costs associated with carbon abatement may exceed those for other pollutants, the scope for such displacement (carbon leakage) may be greater.

[3] Gradual introduction can avoid stranded assets and allow more energy efficient capital goods to be installed as part of the normal investment cycle.

While it is true that differences in regulatory stringency may distort competition, this has to be set in the context of a host of other differences in both factor prices (e.g. energy, raw materials, labour) and broader fiscal and regulatory requirements (e.g. corporation tax). As an example, Swedish electricity prices were only half those in the UK in 1999, while Japanese industrial electricity prices were more than twice UK levels. While harmonisation is proceeding in some of these areas in the EU, progress is relatively slow (e.g. energy taxes). This suggests that the differences in factor prices are likely to remain.

In general, it is clear that differential treatment can damage the competitiveness of individual companies or sectors and hence could be a cause for concern. But it is equally clear that the competitiveness impacts of environmental regulations can be (and frequently are) exaggerated (Ekins and Speck, 1998).

4.7 Summary

This section has explored the issues surrounding policy interaction in general terms, developed a typology of policy interaction and suggested a framework within which policy interaction may be studied. The key points include:

- It is useful to distinguish between *internal* interaction between two policies in the same policy area, and *external* interaction between two policies in separate policy areas. Similarly, it is useful to distinguish between *horizontal* interaction between two policies on the same governance level and *vertical* interaction between two policies on different governance levels.
- Policy interaction is seriously neglected in the academic literature. But a number of projects have demonstrated that internal and external interaction are both major determinants of policy outcomes and major drivers of policy change. Gunningham and Gabrosky claim that a mix of policy instruments is generally more effective than individual instruments acting alone and that such a mix will work more effectively if a broader range of participants are involved implementation.
- It is useful to distinguish five distinct types of policy interaction:
    - *Direct interaction*: where the target groups directly affected by two policies overlap in some way;
    - *Indirect interaction*: where either: a) the target group directly affected by one policy overlaps with the target group indirectly affected by a second (or vice versa); or b) the target group indirectly affected by one policy overlaps with the target group indirectly affected by a second;
    - *Operational interaction*: where two policies operate together in that either: a) individual target groups (companies, installations, sources etc.) may move from one policy to the other under certain conditions; or b) the obligations and incentives imposed by one policy are deliberately modified as a result of the coexistence of a second policy.
    - *Sequencing interaction*: where one policy which directly affects a target group is followed in time by a second policy which directly affects the same target group.
    - *Trading interaction*: where two policies are linked by the exchange of an environmental trading commodity, such as a GHG emissions allowance.

- Interaction analysis involves a systematic examination of:
  - the *scope* of the instruments, where scope means the sectors, sites, portions of sites and individual emission sources that are directly or indirectly affected by each instrument;
  - the *objectives* of each instrument and the extent to which these reinforce or conflict with one another;
  - the *operation* of each instrument, including the aggregate effect of the different obligations and incentives.
  - the *implementation* of each instrument, including the scope for rationalisation and harmonisation; and
  - the *timing* of the instruments, including responses to triggers and the scope for policy sequencing.
- Interactions between policy instruments may lead to complaints of *double regulation* or *differential treatment*, which in turn may lead to distortions of competition. But both of these claims may be exaggerated. In practice, the aim is not to completely avoid double regulation or differential treatment, but to determine the circumstances in which interaction between two policies is either acceptable or unacceptable.
- The focus of the INTERACT project is the interactions between the EU ETS and other climate policies at the Member State and EU level. Attention is confined to those interactions which are of particular economic significance. In exploring these, it is initially assume that the existing policy instruments remain unchanged after the EU ETS is introduced. The outcome of this assessment is then used to guide the development of policy options, which are in turn examined for their likely interactions. The overall aim is to explore the nature of the issues that arise, and to identify ways in which conflicts can be avoided and synergies created. This leads in turn to the development of specific policy recommendations.

5. Policy interaction and emissions trading

5.1 Introduction

This section examines the interaction between GHG emissions trading and other policy instruments in theoretical terms. The discussion draws upon the general framework set out in sections 2 and 3 and applies it to the particular and unique case of emissions trading. It examines in turn:

- the design of a carbon ETS;
- the indirect impacts of an ETS;
- compliance obligations and the double counting of emission reductions;
- rationales for the direct and indirect interaction of other instruments with an ETS;
- rationales for the operational interaction of other instruments with an ETS;
- rationales for the sequencing interaction of other instruments with an ETS; and
- rationales for the trading interaction of other instruments with an ETS.

5.2 The design of a carbon emissions trading scheme

There are two broad choices in the design of 'cap and trade' schemes for CO_2 emissions:

- *Upstream*: An upstream scheme requires fossil fuel *producers*, together with processors and transporters to surrender allowances for the CO_2 emissions embodied in the fuel processed, transported or sold by them. Participants include oil refineries, coal producers and gas processing plants. Nearly all emissions from fossil fuels would be covered.
- *Downstream*: A downstream system requires fossil fuel *users* to surrender allowances for their emissions. Users could include electricity generators, industrial plants and commercial facilities. Administrative considerations are likely to confine this type of system to larger users and hence only a portion of fossil fuel emissions would be covered.

A *hybrid* scheme is also possible. In this, large users would be required to hold allowances for their emissions, while smaller users would be covered upstream by requiring fuel producers to surrender allowances for the fuels consumed by these users. In this way, comprehensive coverage of fossil fuel emissions could be achieved.

Each option has pros and cons, but the upstream scheme presents particular difficulties as it would effectively place a cap on the market for fossil fuels. If fossil fuel demand is inelastic in the short term, fuel prices may rise significantly, with negative effects for all classes of consumer including householders. The economic and equity consequences may be considered unacceptable, particularly for low income consumers. From the perspective of consumers an upstream scheme is similar to a carbon tax, but with the level of the 'tax' being unpredictable. As a consequence, most practical policy proposals, including the EU ETS, have focused on downstream schemes.

If a downstream scheme is chosen, there is a further choice required on the treatment of electricity generation (Zapfel and Vanio, 2001):

- *Direct*: A direct scheme requires electricity *generators* to surrender allowances for their fossil fuel emissions. All participants in the scheme are only required to surrender allowances for direct emissions from fossil fuel fossil fuel use.
- *Indirect*: An indirect scheme requires electricity *consumers* to surrender allowances for their electricity consumption, using an agreed conversion factor for the carbon intensity of delivered electricity. Participants in the trading scheme are required to surrender allowances for both electricity consumption and the direct use of fossil fuels, while electricity generators are exempt.

Direct allocation has been chosen for the EU ETS. Here, electricity prices will rise to reflect a portion of the marginal abatement cost for scheme participants. Electricity consumers participating in the trading scheme will make abatement decisions (i.e. choose between energy efficiency, substitution between electricity and fossil fuel, cogeneration, and use of the allowance market) based upon: a) an electricity price which has internalised the cost of carbon abatement; and b) the price of carbon allowances relating to their on-site use of fossil fuel.

In contrast, the UK Emissions Trading Scheme (UK ETS) has chosen indirect allocation. This follows the political objective of preventing electricity cost rises from being passed on to domestic consumers. This would be hard to avoid if allowances were required for fossil fuel inputs to electricity generation.

5.3 The indirect impacts of an emissions trading scheme

A fundamental choice in the design of an ETS is between the auctioning or free allocation of allowances (or some combination of the two). While this choice may lead to different costs for ETS participants, there should be no difference in the costs passed on in product prices. This important result rests on a number of assumptions including:

- the majority of firms in a particular product market are covered by the allowance program;
- firms are profit maximising and take rational decisions about entry and exit;
- there is no market power in either the product or allowance market; and
- product prices are not subject to economic regulation.

With allowance auctioning, firms incur costs for abatement plus the allowances purchased in the auction which are used to cover residual emissions. Both are real accounting costs. With free allocation, firms only incur abatement costs, including the net cost of any acquisition of allowances. But the freely allocated allowances have an *opportunity cost* in that they could be sold on the allowance market. This opportunity cost should be treated identically to real accounting costs in a firm's pricing decisions (Harrison and Radov, 2002). Viewing the situation another way, the wealth provided by freely allocated allowances represents a lump-sum profit which should not influence product pricing decisions since, in theory, these are based upon marginal costs.

The difference between auctioning and free allocation lies in the capture of the economic rent, rather than the cost increases for consumers. With free allocation, the rent is captured by the participating firms, thereby increasing their market value. With auctioning, the rent is captured by the government and may be used in a variety of ways throughout the economy, including compensating affected groups and reducing other forms of taxation. But the price impacts for consumers should be identical in both cases.

Whether this result holds in practice will depend upon the validity of the assumptions behind the economic model. For example, agency problems and other factors within firms may move them away from profit maximising behaviour or an individual firm may be able to exercise market power. In the US Acid Rain Program the participating electricity generators were subject to utility regulation, which distorted product pricing by valuing allowances at historic cost (zero) rather than opportunity cost (Bohi and Burtraw, 1992). In countries such as the UK, the electricity generation market is liberalised with relatively limited market concentration, so neither of the last two problems should apply.

It is possible that there will be political objections to firm's pricing decisions. Free allocation is equivalent to a lump sum subsidy to the participating firms which acts to increase shareholder wealth. Consumers face the same price impacts as in an auctioning scheme, but without the compensating use of auction revenues. This may be seen as 'double charging', since consumers pay once as taxpayers, in creating the subsidy, and a second time as consumers in purchasing the sector's products. But the subsidy results from the social creation of scarcity (carbon emissions) and the foregoing of the corresponding economic rent (in the form of auction revenues), rather than through the explicit use of taxpayers money.

It may be possible to compensate consumers for price increases by separating the *allocation* of allowances from the *compliance obligations* for emissions. For example, allowances could be allocated to electricity consumers, while electricity generators remained responsible for compliance. Here, the generators would need to purchase allowances from consumers, with the revenue transfers compensating for any increase in electricity prices. In practice, a combination of transaction costs, lobbying by ETS participants and legal restrictions on who can receive allowances may limit the feasibility of this alternative. For example, the EU ETS restricts the allocation of allowances to participants in the scheme.[4]

5.4 Compliance obligations and the double counting of emission reductions

5.4.1 Compliance obligations and control of emissions

Compliance obligations refers to the legal obligation to surrender an allowance when emitting a specified quantity of emissions. Participants in a cap and trade scheme have compliance obligations for some or all of their emissions. These obligations are separate from the right to *own* an allowance, since in most schemes (including the EU ETS) anyone can acquire and

[4] It would be possible to allocate allowances to energy intensive industries participating in the EU ETS to compensate them for increases in electricity prices. However, the same compensation could not be extended to non-participants.

own an allowance, but only the participants in the scheme have obligations to use them to cover their emissions. Similarly, the recipients of allowances under a free allocation scheme need not be same as the participants in the scheme - as illustrated by the above example of indirect allocation for electricity emissions.

Participants in the trading scheme may have varying degrees of *control* over the emissions for which they have compliance obligations for. The relative location of obligations and control has important implications for the operation of a trading scheme, including the incentives created for participants and the corresponding investment and behavioural changes. For example, electricity generators have direct control over the carbon intensity of electricity generation, through investment and operational decisions such as fuel switching, but they have only partial control over total electricity demand through electricity prices. In contrast, electricity consumers have direct control over their electricity demand, through investment and operational decisions such as energy efficiency, but have no control over the carbon intensity of electricity generation unless some form of 'carbon labelling' of electricity is available.

5.4.2 Disputes over compliance obligations

Within an individual trading scheme, the compliance obligations are normally clear. But problems may arise when attempts are made to:

- allow a single source to participate simultaneously in two different types of GHG trading schemes; or
- allow fuel, electricity or allowances to be traded between participants in two different types of GHG trading scheme.

This is because the compliance obligations for emissions may become disputed. The problems that result can be grouped under three headings (Zapfel and Vanio, 2001):

- double slippage;
- double coverage; and
- double crediting.

Double slippage
This is where the regulatory coverage of emissions is lost. It is particularly relevant to the trading of electricity between participants of two national trading schemes, where one has indirect accountability for the emissions from electricity generation and the other has direct accountability

Suppose country A has a trading scheme with indirect accountability, and country B has a scheme with direct accountability. And suppose country A exported electricity to country B. Emissions from country A would have increased as a consequence of the fossil fuel used in electricity generation. But no entity would have surrendered allowances as the generators in country A are not covered by the trading scheme and the electricity is not consumed by scheme participants. Similarly, no entity in country B would have surrendered allowances since their electricity consumers are not accountable for the emissions from electricity generation. The emissions are 'missed' by both trading schemes.

Emissions would also have been missed if the electricity had been consumed in country A by some entity other than a participant in the trading scheme. This is because the trading scheme in country A does not have full coverage of the emissions from electricity generation. Country A is likely to have introduced other policies to compensate for this.

This scenario is important, however, for two neighbouring EU countries that have large inter-country electricity flows. The emissions associated with the exported electricity may be substantial, but neither the exporter or the importer would be liable. This could distort competition in the generation market – for example, electricity imports from country A could displace electricity from the national generators in country B, because the price of the latter includes carbon abatement costs but the price of the former does not. The possibility of double slippage and competitive distortions to the electricity market in this context is one of the primary reasons the Commission has proposed a harmonised EU trading scheme with direct allocation to electricity generators (Zapfel and Vaino, 2001).

Double coverage

This is the mirror image of the above scenario. Suppose country B exported electricity to a company in country A which was a participant in the latter's' trading scheme. Electricity generators in country B would need to surrender allowances to cover the emissions associated with this electricity. And the company purchasing the electricity in country A would also need to surrender allowances. In other words, two sets of carbon allowances would be surrendered for the same quantity of electricity. The emissions associated with that electricity would be covered twice by two separate trading schemes.

A similar scenario is possible if energy commodities (coal, oil, gas etc.) are traded between two countries, where one has an upstream trading scheme and one has a downstream scheme. For example, fossil fuel exporters in country A (with an upstream scheme) may have to surrender allowances corresponding to the carbon content of the fuel, while consumers in country B (with a downstream scheme) may also need to surrender allowances corresponding to the carbon emissions from the fuel. But in practice, this scenario is unlikely since the Kyoto Protocol makes Parties accountable for the carbon content of fuels they produce and import, but not of the fuels they export. This means that, in the above scenario, the fossil fuel exporter in country A was not need to surrender allowances for fossil fuel exports and the emissions would only be covered once. Since fossil fuel import/exports can be relatively easily tracked, implementing this should not present any major administrative difficulties. In contrast, it is much more difficult to account for cross border electricity trade since here the allowances are surrendered by generators when generating the electricity, while the electricity is traded by separate supply companies. In principle, compensation mechanisms would be required which linked the volume of electricity exported to the generation from individual plants.

Double crediting

The third situation is where two sets of carbon allowances are *generated* or *freed up* from a single abatement action. Again, suppose country B has a trading scheme with indirect accountability, and country A has a scheme with direct accountability. Suppose further that an electricity generator in country A was exporting electricity to a company that was participating in country B's trading scheme. If the purchasing company reduced its electricity consumption, this would: a) free up allowances in country B's scheme that are owned by the purchasing company; and b) free up allowances in country A's scheme that are owned by the generator (since less electricity is generated, emissions are reduced). In this case, two sets of

carbon allowances are freed up, or 'generated' from a single abatement action. The avoided emissions are 'credited' twice in two separate trading schemes.

Similar types of double crediting problem may arise if:

- an upstream trading scheme is introduced in a country which has an existing downstream trading scheme (or vice versa); or
- a trading scheme with direct allocation is introduced in a country which has an existing trading scheme with indirect allocation (or vice versa).

In both cases, it is assumed that the existing scheme is left unchanged.

The second of these situations is exactly that faced in the UK. The EU ETS is a cap and trade scheme with direct allocation, but the UK ETS uses indirect allocation. Coexistence of the two leads to both double coverage and double crediting. And coexistence will occur if the EU ETS is introduced in the UK, without first changing the UK ETS and associated instruments.

The problem is perhaps most clearly illustrated by the proposals for emission reduction projects in the UK (Begg et al 2002). These are baseline and credit arrangements analogous to JI and the CDM, but for projects within the UK. One of the priority sectors for such projects is public and commercial buildings. Projects that reduce energy (fuel or electricity) use in these buildings may be eligible for carbon credits. But from 2005, UK electricity generators will join the EU ETS. If the project continues after this date, it will be generating credits from reductions in electricity demand, which are allocated to the project developer, while at the same time freeing up allowances from electricity generation, which are allocated to the generators.

5.4.3 Problems of one-way double-crediting

Disputes over compliance obligations introduce complexity into the regulatory situation and make it more difficult to estimate the contribution of different instruments to overall emission reductions. But it is important to distinguish between:

- situations where double coverage and double crediting are present simultaneously and where the first effectively cancels out the second; and
- situations where only double crediting is present and there is scope for inflation in the number of allowances.

Both are possible, but the second is more important as it could threaten the environmental integrity of an ETS.

As an example, take the interaction between the EU ETS, which uses direct treatment of electricity emissions, and the UK ETS which uses indirect treatment. If all allowances are used to cover emissions, an emissions increase (decrease) in electricity-related emissions from participants in the UK ETS would lead to an equal and opposite decrease (increase) in the total emissions covered by the UK ETS and EU ETS combined (Sorrell, 2002, pp 103-109). This is because allowances would be bought (sold) in *each* scheme to cover the increase (decrease) in participant emissions. If *any* emissions are double covered (i.e. require two allowances), the total emissions covered by both the UK ETS and EU ETS will be *less* than

the sum of the allowance caps in the two schemes. If *no* emissions are double covered (such as would occur if emissions from these sources fell to zero), the total emissions covered by both the UK ETS and EU ETS will be *equal* the sum of the allowance caps in the two schemes. In other words, the sum of the individual allowance caps provides an overall cap on the total emissions from the combined schemes. Since the double counting does not breach the cap in either scheme, environmental integrity is maintained. In effect, the double crediting is cancelled out by the double coverage. This result still applies even when there is trading interaction between the two schemes.

However, the same result does not apply to the coexistence of the EU ETS with the UK project scheme. In this case, double crediting is not cancelled out by double coverage – in other words, there is 'one way' double crediting. Any trading of project credits into the EU ETS could undermine the environmental integrity of the scheme. If this was considered unacceptable, it may rule out the use of project mechanisms to encourage downstream electricity efficiency, or rule out trading interaction between the two schemes. Alternatively, double crediting could be seen as a price worth paying for either incentivising emission reduction projects, or achieving the cost savings from trading interaction.

In practice, much is likely to depend upon the likely scale of the problem and the timescale over which it is anticipated to persist. For example, if only a small number of relatively small scale emission reduction projects are expected, the double crediting described above may be considered to be largely irrelevant. Conversely, if very large projects are expected, which will generate credits over a long period of time (e.g. life extension of nuclear power stations), then double crediting may be considered a serious problem.

5.5 Rationales for the coexistence of other instruments with an emissions trading scheme

The following sections discuss possible justifications for combining a cap and trade ETS with other climate policy instruments. The discussion is confined to those instruments which have the primary objective of reducing greenhouse gas emissions - in other words, to those interactions which are internal to climate policy. The discussion is not intended to be comprehensive, but it does provide a useful overview of the type of interactions which will be triggered by the introduction of the EU ETS in the EU and for which policy decisions will be required in the near future.

In many cases, it is possible to develop justifications for combining other instruments with an ETS. But these justifications raise both theoretical issues regarding the legitimacy of government intervention and empirical issues regarding the design of individual instruments. In many cases there will be trade-offs between long-term and/or non-efficiency objectives and short-term increases in abatement costs. If the policy mix is to gain legitimacy, these objectives and trade-offs need to be made explicit.

The discussion is divided into four sections:

- rationales for direct and indirect interaction with an ETS;
- rationales for operational interaction with an ETS;
- rationales for sequencing interaction with an ETS; and

- rationales for trading interaction with an ETS.

The most attention is given to the first of these categories, as this contains the most important types of interaction that may be encountered. This section begins with a general discussion of the issues raised by interaction with a cap & trade ETS, before examining some specific instrument combinations in more detail.

In each case, the discussion draws heavily upon the insights provided by Johnstone (2002); Smith, (1999) and Sijm (2003).

5.6 Rationales for the direct or indirect interaction of other instruments with an emissions trading scheme

5.6.1 Policy interaction under a cap

A defining feature of a cap and trade ETS is that, assuming adequate enforcement and full compliance, there is certainty that total emissions will be equal to the aggregate cap. A second feature of a cap and trade scheme is that, under a standard set of assumptions regarding the competitive operation of the allowance market, the trading scheme will allow the target to be met at least cost. In the equilibrium, marginal abatement costs will be equalised across sources and equal to the allowance price.

As Sijm (2003) has argued, these idealised features of an ETS have important implications for policy interaction. Coupled with comparable assumptions regarding the idealised operation of the relevant product markets, they imply that the use of a second instrument that directly or indirectly interacts with the ETS will increase the overall costs of meeting the emissions cap while at the same time having no influence on environmental effectiveness - where the latter is defined as assurance in meeting the ETS cap. The aggregate abatement costs of ETS participants may be either increased (e.g. by a carbon tax) or reduced (e.g. by a subsidy scheme) by the second instrument, but in all cases the aggregate social costs of meeting the cap will be increased and participant emissions will continue to be less than or equal to the cap. This result applies both to instruments which directly affect CO_2 emissions from ETS participants, such as a carbon tax on fuel use, and to instruments which indirectly affect those emissions, such as a tax on electricity consumption of both participants and non-participants (Sijm, 2003).

To illustrate this, assume that the second instrument is a negotiated agreement (NA) which sets emission limits on a subset of ETS participants in terms of emissions per unit of output. It is straightforward to demonstrate that, where the NA limits are binding, they increase the marginal abatement costs of affected ETS participants by a factor λ, which is a measure of the change in costs for a marginal change in the NA emission limit (Sorrell, 2002, p112-115). As a consequence of this 'double regulation', the affected participants are likely to reduce emissions further than they would under the ETS alone, which means that they are likely to either sell more allowances or purchase fewer allowances. The consequent reduction in allowance prices will make it easier for other ETS participants which are not affected by the NA to comply with their ETS obligations. Aggregate emissions will not have changed, since

any 'freed-up' allowances will simply be used by other participants to cover increases in emissions. But aggregate abatement costs will have increased, since the distribution of abatement actions across participants will have departed from the cost minimising optimum (Sijm, 2003). Also, the differential treatment of participants may have introduced distortions to competition, with the participants subject to the 'double regulation' effectively subsidising competitor participants which are not.[5] If *all* ETS participants are subject to the NA targets, the primary effect will be to increase overall abatement costs and lower the allowance price. If the emission limits from the NAs are sufficiently stringent, aggregate emissions will be reduced below the cap, the ETS will become redundant and the price of allowances will fall to zero.

Very similar conclusions apply to instruments which indirectly affect ETS participants such as an electricity tax. In this case, reductions in electricity demand will substitute for lower cost abatement by ETS participants (e.g. fuel switching), while overall emissions will be unchanged. Again, a very stringent electricity tax could reduce electricity consumption sufficiently that aggregate emissions are reduced below the cap and the ETS becomes redundant. However, if the electricity generators form only a subset of ETS participants, this is unlikely.

In practice, allowance and product markets may only approximate the theoretical ideal. Market failures will be pervasive in both markets and the political bargaining that led to the ETS cap is unlikely to provide an adequate reflection of the 'social optimum' for carbon externalities (to the extent that such a concept is meaningful for global climate change). In addition, governments have objectives which go beyond efficiency, such as the promotion of social equity. In these circumstances, there *may* be legitimate grounds for introducing or maintaining other climate policy instruments that directly or indirectly interact with the ETS. These include:

- improving the static efficiency of the ETS by overcoming market failures other than CO_2 externalities;
- improving the dynamic efficiency of the ETS by overcoming market failures in the area of technology innovation and diffusion;
- delivering social objectives other than efficiency, such as equity and political feasibility; and
- compensating for deficiencies in the ETS design. (Sijm, 2003; Johnstone, 2002).

However, the fact that positive combinations between an ETS and other instruments are theoretically possible does not mean that such combinations will result when an ETS is introduced into an existing policy mix. Furthermore, when an ETS is in place, aggregate emission reductions will be set solely by the ETS cap. Instruments which target emissions covered by the ETS cap will contribute nothing further to emission reductions - unless they are sufficiently stringent that they make the ETS redundant. This means that, *once the ETS is in place, the justification for maintaining such instruments must rely upon one of the above rationales, rather than the contribution of the instrument to overall emission reductions* (Sijm, 2003).

[5] This only applies to those competitors which are buyers of allowances. If they are sellers, the value of their sales will be reduced.

It is important to note that the same conclusion does not follow for instruments which do not directly or indirectly interact with the ETS. These will contribute emission reductions independently of and in addition to the ETS cap. So, for example, if the ETS is a downstream scheme that includes the electricity generators, emissions from household electricity consumption will be covered by the cap while emissions from household fuel consumption will not. Hence, policies which affect the former will directly or indirectly interact with the ETS, while policies which affect the latter will not. Conversely, if the EU ETS is an upstream scheme, *all* fossil fuel emissions will be covered by the cap and all policies that affect these emissions will interact with the ETS. Since none of these policies will contribute anything further to overall emission reductions, the justification for maintaining them must rely solely on one of the above categories.

This following sections discusses five possible rationales for maintaining or introducing other climate policy instruments that directly or indirectly interact with a cap and trade ETS. While other rationales are possible, these five are of particular importance. They are:

- overcoming market failures inhibiting the adoption of energy efficient technologies;
- overcoming market failures in the area of technology innovation and diffusion;
- mitigating allowance price uncertainty;
- achieving supplementarity through 'back-up' regulations;
- raising revenue and capturing windfall rent; and
- achieving distributional objectives.

5.6.2 Market failures inhibiting the adoption of energy efficient technologies

An ETS overcomes one source of market failure by internalising the external cost of carbon emissions. But it is commonly argued that energy service markets suffer from a wide range of market failures which prevent cost effective energy efficiency opportunities from being undertaken (Sorrell et al, 2000). These include imperfect information on efficiency opportunities, and asymmetric information between contracting parties leading to problems of split incentives, adverse selection and moral hazard (Sorrell et al, 2000). A standard example is landlord-tenant relationships in the housing market, where neither party has the incentive to invest in energy efficiency. Similarly, asymmetric information between buyers and sellers prevents house prices reflecting the discounted value of efficiency investments.

It is perhaps more useful to consider these market failures in a relative rather than absolute sense using: '…..a broader category, that of transaction costs, which in general impede and in particular cases completely block the formation of markets…' (Arrow, 1969). Combined with the behavioural assumptions of bounded rationality and opportunism, transaction costs can provide a valuable insight into the nature of barriers to energy efficiency (Sorrell et al, 2000). For example, the transaction costs of contract negotiation help explain why the landlords and tenants do not enter into shared-savings contracts to share the benefits of efficiency investments. Similarly, the bounded rationality of economic agents, coupled with the invisibility of energy efficiency performance, helps explain why purchase decisions are biased towards equipment with low capital cost, but high running costs.

Proponents of energy efficiency argue that public intervention can overcome barriers such as these through reducing transaction costs, economising on bounded rationality, aligning the incentives of different groups in the direction of improved efficiency and safeguarding against opportunism (Golove and Eto, 1996). Furthermore, they argue that such measures can be more effective than relatively small increases in energy prices and can deliver net social benefits (Krause, 1996). Economists are more sceptical of such claims and question whether many existing energy efficiency policies are in fact cost effective (Joskow and Marron, 1992; Sutherland, 2000).

If the proponents of energy efficiency are correct, the coexistence of such instruments with an ETS will lead to an improvement in static efficiency and a reduction in overall abatement costs. If they are not correct, the coexistence of such instruments will increase overall costs. Ultimately this is an empirical question, the answer to which will depend upon the specific market, technology and policy under examination. It may be expected that such policies will be more effective for sectors such as households and SMEs which have both a low energy price elasticity and a substantial economic potential for efficiency improvement. While these sectors are unlikely to participate directly in a carbon ETS, they may be indirectly affected by increases in fuel or electricity prices.

5.6.3 Market failures in the area of technology innovation and diffusion

Energy efficiency policies are targeted at market and organisational failures which inhibit the adoption of established energy efficient technologies. But market failures may also obstruct the innovation and diffusion of new low-carbon technologies, such as renewable electricity sources. There may be legitimate grounds for supporting the innovation and diffusion of such technologies, independent of their contribution to carbon abatement over the short term. For example, it is well established that private markets will under-invest in R&D as a consequence of both the uncertainty and intangibility of R&D outcomes and the inability of innovators to fully appropriate the social returns of such investment (Stoneman and Vickers, 1988). Also, the development of new technologies is characterised by learning-by-doing, where performance improves and costs fall as production experience is accumulated (Ibenholt, 2002). Learning creates an additional source of positive externality, as the act of investment benefits future investors, but the benefit is not paid for by the market (Arrow, 1962). These arguments point to a general role for government in both funding R&D and in steering innovation in desired directions (Grubb, 1997; Gross and Foxon, 2002). This can be achieved in a variety of ways, but it is generally recognised that policies need to avoid 'picking winners' (Hall 2002).

Two other factors may legitimate government support for such technologies:

- The increasing returns to adoption as a result of learning-by-doing may combine with other factors to both *lock-in* dominant technologies and *lock-out* viable alternatives (Arthur, 1989). These other factors include scale economies in production, the inertia of long-lived capital stock, and the network economies associated with the relations between technologies, infrastructures, interdependent industries, suppliers, users, public and private institutions (e.g. trade associations, universities etc.) and public expectations (Unruh, 2000). This implies that a failure to invest in the development of low carbon technologies such as renewables could lead to lock-in to a high emissions path and make the cost of switching to alternative technologies prohibitive. Again, the policy recommendation is for

targeted support in areas that offer significant opportunities for low-carbon innovation (Grubb and Ulph, 2002).

- The expectation that global targets on carbon emissions will tighten creates the possibility that early support for low carbon technologies may drive down unit prices sufficiently to form the basis for viable industries with significant export potential. An example of this 'early mover advantage' is German support for wind power, which saw investment costs decreasing from €4500/kWh in 1992 to below €1000/kWh in 2002 and enabled German firms to capture much of the world market (Haas, 2002).

In sum, technology market failures could potentially provide a rationale for supporting the diffusion of emerging low carbon technologies alongside a carbon ETS. But these rationales are less well established than environmental externalities as a basis for government intervention and there is a lack of consensus over either the extent of intervention that is appropriate or the particular instruments that should be used.

5.6.4 Backup regulations and supplementarity

If allowance prices are anticipated to be low, there may be an argument for retaining other instruments as a 'backup' to ensure a minimum level of abatement by ETS participants.

In the first instance, allowance prices will be determined by the size of the cap relative to the aggregate marginal abatement cost curve. But an important complication is the possibility of trading interaction with the Kyoto mechanisms. A combination of the refusal of the US to ratify the Kyoto Protocol, the surplus 'hot air' in the assigned amounts to Russia and the Ukraine, and the generous provisions for crediting carbon sequestration by 'sinks' has created the possibility of very low carbon prices after 2008 (Den Elzen and de Moor, 2003). In this context, any interface between a carbon ETS and the international carbon market could have the effect of reducing the ETS allowance price and substituting the purchase of fungible carbon commodities from outside the ETS for abatement by ETS participants. The debate over 'supplementarity' demonstrates that this is an ongoing concern for Member States, several of whom may prefer to prioritise domestic abatement over aggregate emission reductions. While one method of incentivising such abatement would be to restrict trading links, this option may not always be available.

If other policies are maintained or introduced as an alternative means of ensuring 'supplementarity', the net result will be to increase abatement costs within the domestic ETS, reduce emissions from ETS participants, and either increase allowance sales to or reduce allowance purchases from the linked trading scheme. If both the domestic and linked ETS are of the cap and trade form, the aggregate emissions within the two schemes will remain unchanged. Conversely, if the linked ETS uses relative rather than absolute targets, or if credits from project mechanisms are used, the environmental integrity of an overall cap will be lost.

A possible rationale for giving priority to domestic abatement would be to put a country 'on course' for achieving much greater reductions in CO_2 over the next half century. This objective relies on a set of explicit or implicit assumptions regarding: the uncertainty and potential severity of climate threats; the appropriate global targets for CO_2 emissions over the medium to long term; the appropriate contribution of different countries towards those targets; the importance of domestic action by developed countries to encourage the

subsequent participation of developing countries in the Kyoto Protocol; the need to ensure a transition away from long-lived, CO_2-intensive capital stocks and infrastructure; and the consequent threat of high adjustment costs in the future should that transition be delayed (Grubb, 1997; RCEP, 2000). While each of these assumptions can be questioned, the 'pathways' objective has become explicit in the climate policy of some Member States. For example, the UK has a 'goal' of reducing CO_2 emissions to 20% below 1990 levels by 2010 (DETR, 2000b) (a target which goes beyond requirements under the EU burden sharing agreement) and has recently expressed a commitment to 'put the UK on a path' to reducing CO_2 emissions by some 60% below current levels by 2050 (DTI, 2003).

These domestic targets have led to a debate over whether the allocation to UK participants in the EU ETS should be consistent with the 20% goal or with the UK's burden sharing target. But the former would not necessarily succeed in reducing *domestic* UK emissions because participants could simply purchase allowances from other Member States. Although the overall EU cap would be tightened by the UK's actions, the overall size of that cap will depend upon the allocation decisions of other Member States. In contrast, the coexistence of the EU ETS with 'back-up' policies would achieve greater emissions reductions in the UK (but not in the EU) at the expense of higher abatement costs and potential damage to the competitiveness of UK industry.

5.6.5 Revenue raising and capturing windfall rent

A particularly difficult and sensitive issue is the rationale for retaining carbon/energy taxation alongside an ETS. Carbon/energy taxation of the fuel used by a participant in a downstream ETS will distort the *substitution* objectives of each instrument since marginal emissions will be priced twice for ETS participants, at different implicit or explicit rates, but only once for non-participants. Similarly, the coexistence of carbon/energy taxation of electricity with the participation of electricity generators in the ETS will distort the incentives to substitute between fuel and electricity consumption.

Despite these distortions, there may be circumstances where the retention of the carbon/energy tax provides compensating benefits. This may particularly be the case when allowances are freely allocated to ETS participants rather than auctioned. Free allocation violates the polluter pays principle in that participants only pay for the marginal damage of CO_2 emissions, while inframarginal emissions remain unpriced. This is in contrast to the use of allowance auctions which impose costs for all emissions. Free allocation may also undermine the incentives for technical innovation to reduce emissions (Downing and White, 1986; Millman and Prince, 1989).

Free allocation also means that the ETS can contribute nothing to the government's fiscal objectives. No revenue is being raised and the economic rent from allowance distribution is distributed wholly to shareholders. This is in contrast to an auction scheme where allowance revenue can be used to compensate affected groups or to reduce other forms of taxation. Numerous studies have demonstrated how the recycling of auction or tax revenue to reduce other forms of taxation can provide a net welfare benefit (de Mooji, 1999). While the extent of this 'double dividend' is contested, the efficiency benefits of auctioning compared to free allocation are not.

Despite the theoretical benefits of auctioning, free allocation is the norm and is likely to remain so for the foreseeable future. In these circumstances, the retention of existing

carbon/energy taxes after an ETS is introduced may be seen as a pragmatic, second-best alternative to the use of allowance auctions. If applied directly to ETS participants, it will: a) ensure that a portion of inframarginal emissions are priced - albeit at a different rate to marginal emissions; b) increase the incentives for technical innovation - although this will be balanced by the reduction in the value of allowance holdings that a tax creates; and c) provide a means to recover some of the windfall rent from allowance allocation. If applied either directly to participants or indirectly to consumers, it will ensure that the revenues from the carbon/energy tax are maintained (Johnstone, 2002).

In practice, the last benefit is likely to be particularly important. Having established a carbon/energy tax (generally in the face of vigorous opposition) a government will be reluctant to relinquish the income benefits simply to rationalise the substitution incentives of the policy mix. Carbon/energy tax revenues are commonly used to offset other forms of taxation, fund R&D programmes or provide subsidies and tax allowances for the adoption of low carbon technologies. If the tax is removed, this revenue must either be recovered from other sources or the relevant programmes abandoned.

5.6.6 Distributional objectives

In addition to overcoming a variety of market failures, many so-called climate policies have social objectives. This is true in the UK, for example, where a combination of income inequality and a poor quality housing stock leads to 4.5 million households living in 'fuel poverty'. Efficiency investments in these households are commonly taken up in improved levels of energy service, such as warmer homes, rather than reduced consumption. While the CO_2 benefits of such investments are close to zero, quality of life is improved and savings may be made in areas such as health care. In view of this, the energy efficiency obligations that are imposed on UK electricity and gas suppliers require that at least 50% of investment be in low income households.

While households are unlikely to participate directly in a carbon ETS, they may be indirectly affected by increases in fuel or electricity prices. But allowance prices would need to be very high to have a significant impact on energy efficiency in these sectors, and the resulting impacts are likely to be regressive without explicit compensation (Johnson et al, 1990). Political objections to the distributional impacts could lead to the overall cap being set out and inefficiently low level. Hence, policies complimentary to the ETS may both compensate for the adverse distributional impacts of an ETS, while at the same time actively promoting the welfare of low income groups.

5.7 Rationales for the operational interaction of other instruments with an emissions trading scheme

The interaction between an ETS and another instrument may be deliberately designed. This type of *operational* interaction was defined in section 4.4.3 as taking two forms:

- directly affected economic actors, groups of actors or the entire target group may move from one policy to the other under certain conditions; or

- the obligations and incentives imposed upon some or all of a target group by one policy may be deliberately modified as a result of the coexistence of obligations and incentives imposed by a second policy.

Operational interaction between two instruments may be sometimes referred to as a 'hybrid' scheme or a 'package' of instruments. Examples that are of particular interest for GHG emissions trading include:

- using taxes to penalise non-compliance;
- using 'hybrid' instruments to mitigate allowance price uncertainty;
- using opt-in provisions to extend the scope of the ETS; and
- using opt-out provisions to improve political acceptability.

5.7.1 Using taxes to penalise non-compliance

If a cap & trade scheme is to provide some certainty in achieving the cap, there must be a high probability of detecting non-compliance, combined with effective sanctions. To be effective, the sanctions must be much higher than the prevailing or expected allowance price. Also, there is a negative correlation between the probability of detecting non-compliance and the optimum level of the sanctions (Johnstone, 2002, p14).

Many ETS build these sanctions into the design of the scheme. But an alternative is to use an existing or proposed tax as the sanction. For example, a non-compliant source may be required to pay a tax on all of the previous year's emissions. This would be particularly effective for schemes with free allocation, since the cost of purchasing additional allowances to cover marginal exceedances of the ETS target will be much less the cost of tax payments on all of the previous year's emissions. This is the approach taken with negotiated agreements in the UK and has proved effective in ensuring compliance (FES, 2003).

In practice, the ETS may also include additional sanctions, such as the need to purchase additional permits in subsequent years to make up for the shortfall.

5.7.2 Using hybrid instruments to reduce allowance price uncertainty

In the above example, the tax is set much higher than the allowance price and is intended to act as a deterrent. But another possibility is to set a lower level of tax and to give participants the option of paying the tax if the allowance price exceeds a certain level. Here, the tax acts as a 'safety valve', in order to mitigate the uncertainty in abatement costs and allowance prices in reaching a certain emission target (Smith, 1999, p211).

The logic of this derives from the basic features of an ETS compared to a tax. Assuming adequate enforcement and full compliance, an ETS gives certainty in achieving the cap but uncertainty in the allowance price and the associated abatement costs. A tax does the opposite: providing an upper limit on the marginal abatement costs but uncertainty in the environmental outcome. As Weitzman (1974) argued, the choice between the two should theoretically depend upon the shape of the marginal damage curve. In situations where abatement costs rise sharply with additional pollution control, 'price-based' regulations such as a tax are preferred, while in situations where pollution damage rises sharply with additional pollution, 'quantity-based' regulations such as an ETS are preferred.

Hybrid tax-trading schemes, along the lines originally proposed by Roberts and Spence (1976), provide a compromise between the two. The tax sets a ceiling on abatement costs and allowance prices. If abatement costs are higher than anticipated, and the price of allowances rises above the level of the tax, participants will prefer to pay the tax rather than purchase allowances from the market. The original Roberts and Spence model also used subsidies to place a floor on allowance prices, but these have attracted much less interest from policymakers.

Several authors have advocated the use of hybrid tax/trading schemes for the control of CO_2 emissions (Pizer, 1999; Mckibbin and Wilcox, 2002). For example, Mckibbin and Wilcox (2002) argue that the marginal cost curve for reducing greenhouse gas emissions is relatively steep, while the marginal benefit curve is relatively flat. This points to the use of a tax instrument rather than an ETS, but the resulting wealth transfers are likely to be unacceptable. As a compromise, a hybrid policy could provide some of the benefits of a quantity scheme while the same time imposing an upper limit on marginal abatement costs. This in turn should improve the political acceptability of emission controls in countries such as the US. The drawback, of course, is that it removes the guarantee of meeting a particular emission target and hence runs counter to the framework agreed at Kyoto.

5.7.3 Using opt-in provisions to extend the scope of the ETS

To minimise administrative costs, downstream cap and trade schemes are usually confined to a limited number of large sources. By restricting the cap in this way, low cost abatement opportunities may be left outside the cap and the risk of non-compliance with national emission targets may be increased.

In this context, there may be some benefit in giving sources outside of the cap the opportunity to *opt-in* to the ETS. Opt-ins may be allowed on a sector, company or individual installation basis, and if eligible sources are already subject to other forms of GHG emission regulation, consideration should be given to exempting opt-in sources from those regulations. To provide an effective incentive to opt-in, eligible sources would expect to receive allowances on similar terms to existing participants. As a result, the size of the cap would increase.

The incentives to opt-in will depend upon the anticipated sum of abatement, administrative and transaction costs both inside and outside the scheme - including any net revenues from allowance sales. This in turn will depend upon a variety of factors, including the stringency of existing regulatory obligations relative to the anticipated ETS allowance price and the relative costs of monitoring, reporting and verification.

The primary advantage of opt-ins is that they widens the scope of the ETS and bring more installations under the absolute emissions cap. A second advantage is that they encourage sources with low-cost emission reduction opportunities to make those reductions available to ETS participants. This in turn should increase allowance supply, lower allowance prices and lower marginal abatement costs. Such a mechanism allows low cost abatement opportunities to be exploited such that the aggregate ETS cap is achieved at less cost.

An alternative possibility is that sources choose to opt-in because purchasing allowances in the ETS offers lower cost abatement than is currently required for existing regulations. This mechanism will raise allowance demand in the ETS, increase allowance prices and raise

marginal abatement costs. Both types of opt-in should bring marginal abatement costs within the cap closer to those outside, although the former route is more likely in practice. If the number of potential opt-in sources in small relative to the number of existing participants, the effect of opt-ins on the allowance price should be relatively small.

One disadvantage of opt-ins is that they complicate the administration of the ETS. The overall number of sources will be increased and allocation criteria may need to be defined for different types of installation lying outside of the core sectors. Particular complications could result if installations were allowed to join at different times, although this could be avoided if opt-ins were only permitted at the inception of the scheme or at periodic intervals. The provisions that allowed installations to opt-in to the US Acid Rain Program are estimated to have accounted for over half of the total administrative costs (McLean, 1997

Opt-ins also create the risk of injecting 'hot air' into the ETS. For example, a source could be anticipating reductions in carbon emissions as a result of regulatory requirements imposed upon other pollutants (e.g. switching from coal to gas in order to reduce sulphur emissions). If this source opted-in to the ETS, and if it was awarded additional allowances that increased the size of the aggregate cap, overall emissions would increase (as the surplus allowances would be sold and used to cover emissions elsewhere in the scheme). Similarly, a source opting into the scheme could receive an allowance allocation in excess of its current emissions (or its required emissions under regulations such as IPPC) and sell the surplus. Technically, this is a problem of adverse selection and results from asymmetric information between the regulator and firm when defining the allowance allocation. The problem may be particularly acute if allowance allocations are based upon historic emissions, or if non-CO_2 gases are included - since small errors here can lead to very large volumes of CO_2 equivalent emissions and allowance allocations. Problems such as these have been encountered in both the US Acid Rain Program (Montero, 1998) and in the UK ETS (ENDS, 2002) and have threatened the credibility of both schemes.

Opt-ins should be seen as a temporary route to encourage sources with low abatement costs to enter the scheme. In the longer term, the scope of the scheme could be extended in a more harmonised fashion.

5.7.4 Using opt-out provisions to improve political acceptability

Trading schemes may be disruptive to the existing policy mix and may encounter opposition from various interest groups. In the case of the EU ETS, Member States have proved reluctant to abandon existing policy instruments for which they have invested money, time and energy in developing. Similarly, eligible participants have exhibited strong preferences for maintaining the existing policy mix.

In this context, the political acceptability of the ETS may be enhanced by giving participants the opportunity to *opt-out* of the ETS. Op-outs may be allowed on a sector, company or installation basis and would require the demonstration of *equivalence of effort* in terms of the stringency of emission targets, the associated requirements for monitoring, reporting and verification, and the provisions for non-compliance.

Opt-outs have similarities to opt-ins. With opt-ins the cap can increase in size, but cannot shrink, while with opt-outs, the cap can shrink but cannot increase. In principle, both opt-ins

and opt-outs could be accommodated at the same time, but since each option could be burdensome to administer, a combination of the two could be excessive.

As with opt-ins, the incentives to opt-out will depend upon the anticipated sum of abatement, administrative and transaction costs both inside and outside the cap. This in turn will depend upon a range of factors, and if the decision is to opt-out is being taken prior to the start of the ETS, these factors will be highly uncertain. If by opting-out a source avoids a 'stringent'[6] target, this should lower allowance demand, lower allowance prices and reduce overall abatement costs within the cap. Conversely, if by opting-out a source avoids a non-stringent target, this will lower allowance supply, increase allowance prices and increase marginal abatement costs.

The primary advantage of opt-outs is that they make the introduction of an ETS more acceptable to certain groups. The primary disadvantage is that 'equivalence of effort' may be extremely difficult to assess owing to differences in the scope of the instruments (e.g. the activities, sources and pollutants covered), the nature of the targets (e.g. relative or absolute), the provisions for modifying and updating those targets and the marginal abatement costs under each instrument. For many instruments, abatement costs may be difficult to estimate ex-ante or to observe ex-post. Industry has private information on abatement costs, together with an incentive to reduce the stringency of regulation by exaggerating cost estimates (Bailey and Haq, 2002). While trading schemes provide a clear signal of marginal abatement costs in the allowance price, there is no comparable signal with instruments such as negotiated agreements.

Many Member States have negotiated agreements with energy intensive industry, in which the targets are denominated in energy use per unit of output. These cannot be considered 'equivalent' to ETS targets denominated in absolute emissions because: a) absolute targets give certainty in the environmental outcome, while relative targets do not; b) absolute targets give scope for auctioning and revenue raising while relative targets do not; and c) relative targets act as a subsidy on production, leading to higher emissions for the same level of marginal abatement cost (Gielen et al, 2002). Installations that are allowed to opt-out of an ETS and maintain their existing relative targets may have a competitive advantage over installations that remain in the scheme, and the resulting increase in output from these installations may lead to a net increase in emissions. If this happens, the opt-out provisions would lower the environmental effectiveness of the ETS and introduce distortions to competition.

Opt-out provisions also lead to additional administrative costs. One option for demonstrating equivalence of effort would be to estimate the allocation to different installations under the ETS and then to assess whether their existing targets are 'equivalent' to this estimated allocation. But this implies considerable effort to assess bottom-up allocations, which seems unnecessary when the intention is not actually to allocate allowances.

[6] Defined here as one which would make it a net buyer of allowances in the ETS.

5.8 Rationales for the sequencing interaction of other instruments with an emissions trading scheme

An ETS may be either deliberately preceded or followed by another type of policy instrument. This instrument 'sequencing' may be either conditional or unconditional, and may apply to either a portion or all of the target group.

The primary example of instrument sequencing mentioned by Gunningham and Gabrosky (1998) is the use of voluntary agreements with the implicit or explicit understanding that if the targets are not met a more interventionist measure such as a carbon tax will be introduced. This appears less appropriate to an ETS, however, since ETS designs should already include adequate penalty provisions.

A more relevant use of instrument sequencing is the incremental introduction of an ETS into an existing policy mix in order to improve its political acceptability (Smith, 1999, p207-210). Until recently, emissions trading was unfamiliar in Europe and early proposals encountered both suspicion and hostility. There was resistance from industry, who saw absolute targets as a 'cap on growth', and from environmental regulators whose influence and expertise depended upon the continuation of more traditional forms of regulation. This resistance has declined sharply with the evolution of the Kyoto regime, but there nevertheless remains some appeal in introducing an ETS in an incremental fashion. There are two relevant options (Johnstone, 2002):

- using trading to increase the flexibility of the existing policy mix; and
- using existing regulations as a basis for allowance allocation.

5.8.1 Using trading to increase the flexibility of the existing policy mix

'Cap and trade' schemes are generally preferred to 'baseline and credit' schemes since they provide greater certainty in meeting an environmental target while incurring lower administrative costs during operation (although set-up costs can be substantial). However, baseline and credit schemes are common in practice as a result of their greater political acceptability. This is because such schemes typically use existing regulations as the baseline and hence pose less of a threat to the status quo.

Trading evolved in the United States as a means to introduce flexibility into the existing policy mix. The Emissions Trading Programme (ETP) introduced a limited form of baseline and credit trading both within individual firms (bubbles) and between firms (offsets) (Tietenberg, 1985). The existing regulations were maintained, but the additional flexibility allowed compliance to be achieved at less cost. While the ETP was limited in its economic efficiency, it facilitated a process of learning which provided a basis for the subsequent introduction of cap and trade schemes such as the US Acid Rain Programme (Sorrell, 1994).

Such incremental evolution of emissions trading has been seen elsewhere. For example, firms subject to UK packaging regulations developed their own system of tradable permits to reduce the cost of compliance, and this system was subsequently formalised and accredited by the government (Salmons, 2002). Similarly, the UK Climate Change Agreements were initially negotiated without reference to emissions trading, but facilities were subsequently

allowed to engage in a limited form of baseline and credit trading as part of the UK ETS. This provided an extremely low cost route for compliance (Sorrell, 2003a).

This incremental evolution of baseline and credit schemes is labelled *sequencing* interaction here, because existing regulations facilitate the subsequent introduction of the ETS. But it may also be labelled *operational* interaction, in that the trading arrangements exist alongside the existing regulations and modify their operation.

5.8.2 Using existing regulations as a basis for allowance allocation

If a cap and trade route is chosen, the greatest political obstacle is the initial allocation of allowances. Despite the theoretical benefits of allowance auctions, free allocation remains the norm. Even with free allocation, the distributional impacts may be significant if allowance allocation departs significantly from the existing pattern of emissions.

Political opposition to a cap and trade ETS may be minimised if the allocation rule is closely based upon existing regulatory standards. Even if the allocation rule is based upon historic emissions (pure grandfathering), emission levels are likely to be strongly influenced by the regulatory standards to which the participants were previously subject (unless they were unregulated). Furthermore, the choice to use regulatory standards rather than historic emissions may be of benefit to those who have taken 'early action' and reduced their emissions below the standard.

This process may also be labelled sequencing interaction, because existing regulations facilitate the subsequent introduction of a cap and trade ETS. But, unlike the baseline and credit example above, it does not represent operational interaction because the cap and trade scheme replaces the existing regulations.

5.9 Rationales for the trading interaction of other instruments with an emissions trading scheme

In the climate policy context, trading interaction is more commonly referred to as *linking* trading schemes and is the subject of a growing literature (Haites and Mullins, 2001; Baron and Bygrave, 2002). It is also controversial, as evidenced by the debates surrounding the proposed Directive linking the EU ETS with the Kyoto mechanisms (Climate Action Network Europe, 2003). The primary motivation for trading interaction is to improve economic efficiency by increasing the overall number of participants, thereby improving market liquidity and increasing the scope for cost saving trades. But while such interaction should reduce overall abatement costs, it could pose a threat to environmental integrity.

Trading interaction will create winners and losers, since the market price for allowances following the link will differ from the market price in each scheme prior to the link (Haites and Mullins, 2001, p6). This means that buyers in the scheme with (previously) higher allowance prices and sellers in the scheme with (previously) lower allowance prices should benefit, while sellers in the scheme with (previously) higher allowance prices and buyers in the scheme with (previously) lower prices will suffer financially. But aggregate abatement costs should be less.

There are important differences between trading interaction prior to 2008 and trading interaction during the Kyoto commitment period. The existence of International Emissions Trading (IET) after 2008 may reduce some of the barriers to trading interaction, although by no means all of them. Also, trading interaction may complicate the problems created by banking pre-2008 allowances into the commitment period.

This section will briefly examine the rationales for three different types of trading interaction:

- using horizontal trading interaction to achieve cost savings;
- using vertical trading interaction to achieve cost savings; and
- using one-way trading interaction to incentivise overcompliance.

More detailed treatments are available in Haites and Mullins (2001) and Baron and Bygrave (2002).

5.9.1 Using horizontal trading interaction to achieve cost savings

Horizontal trading interaction refers to the trading of allowances between different GHG trading schemes, both within the same country and (more likely) between countries.[7] While governments could approve individual trades, it is more likely than a general framework will be agreed to define the *fungibility* of allowances between the two schemes.

As indicated above, the primary motivation for such interaction is to exploit cost saving opportunities, the size of which should be proportional to the overall number of participants and the diversity in abatement costs. Generally, the literature concludes that there are relatively few barriers to trading interaction and, where barriers do exist, solutions can be found (Baron and Bygrave, 2002). But some types of interaction may undermine the environment integrity of an ETS, while some solutions may increase administrative costs. Design choices that are of particular importance include (Baron and Bygrave, 2002):

- *Allocation method*: Differences in allocation methods between schemes (e.g. free allocation versus auctions) can create competitive distortions. But trading interaction should reduce these distortions since it leads to a common allowance price and ensures that the lowest cost compliance option is available to all participants. The same applies to the rules for new entrants and plant closures.
- *Scope of the scheme:* Differences in the scope of two trading schemes can create competitive distortions if competitor firms face different prices for emissions. But by equalising the emission price, trading interaction reduces these distortions. Competing firms in different countries may have differential access to trading schemes, but this applies regardless of the existence of a link.
- *Monitoring, reporting and verification requirements:* Differences in the scope of two schemes may result from differences in the monitoring, reporting and verification requirements. For example, the EU ETS excludes non-CO_2 gases on the basis of inadequate monitoring methods, while the UK ETS includes such gases. To the extent that monitoring, reporting and verification is inadequate in one of the schemes, trading interaction may reduce overall environmental integrity. Similarly, if the schemes have

[7] It is assumed that these are government schemes. Haites and Mullins (2001) also discuss trading between government and corporate schemes, but the importance of these seems likely to decline.

different penalties for non-compliance, trading interaction could lead to the 'export' of non-compliance to the more 'lenient' scheme.

- *Relative and absolute targets*: Trading interaction between schemes with relative and absolute targets may undermine environmental integrity. Increases in output from participants in the scheme with relative targets will lead to the generation of more allowances and thereby increase the number of allowances available to participants in the scheme with absolute targets. The UK has attempted to overcome this problem by introducing a 'Gateway' between the relative and absolute sectors of the UK ETS which prohibits net sales from the relative to absolute sector (Sorrell, 2002). But such arrangements may increase administrative costs. Also, net sales from the absolute to the relative sector (i.e. the only outcome that the Gateway allows) are likely to lead to an increase in aggregate emissions from the two sectors combined (Salmons, 2000).
- *Banking:* Trading interaction provides a means to circumvent any differences in banking rules between the two schemes. For example, participants in the more restrictive scheme could sell unused allowances to participants in the other scheme with an agreement to purchase them back after a certain date. In some circumstances, this could create difficulties with regard to a country's compliance with its Kyoto obligations. The country allowing banking could record a significant inflow of allowances prior to 2008, and a significant outflow after 2008. The latter would need to be paralleled by the transfer of AAUs, leading to fewer AAUs available to cover Kyoto obligations.

Article 24 of the EU ETS provides for trading interaction with other national schemes. It allows agreements to be concluded with third parties to allow for the mutual recognition of allowances. The third party must have ratified the Kyoto Protocol, which would exclude trading with the US. Possible trading links with the UK ETS are examined in the UK case study (section 6).

5.9.2 Using vertical trading interaction to achieve cost savings

A key question for the first commitment period is the interface between national and regional trading schemes and the Kyoto mechanisms. This includes both accounting for cross-border allowance trades, and the scope for trading interaction.

The Kyoto Protocol has created three different trading mechanisms with three different commodities:

- *International Emissions Trading (IET)*: Assigned Amount Units (AAUs).
- *Joint Implementation(JI)*: Emission Reduction Unit (ERUs).
- *Clean Development Mechanism (CDM)*: Certified Emission Reductions (CERs).

In addition, the Marrakesh Accords introduced Removal Units (RMUs) from land use and forestry projects. Each of these commodities is denominated in tCO_2e, but it is unlikely that they will be fully fungible on the international market, or that they will trade at a common price. Instead, it appears more likely that international carbon market will be differentiated, both *between* commodities (e.g. CERs commanding a higher price than AAUs) and *within* commodities (e.g. CERs from small renewable projects commanding a higher price than those from large hydro projects) (Grubb, 2003). The reasons relate to the complex international politics of Kyoto, including the reluctance of many countries to purchase

excessive 'hot air'. As a result, international carbon prices may not be as low as simple optimising models suggest (Grubb, 2003).[8]

After 2008, cross-border trades in ETS allowances will need to be coupled to transfers of AAUs between the relevant Member States. If this were not the case, a net-buying Member State would run the risk of non-compliance with its Kyoto obligations, despite all ETS participants being in compliance with their individual targets.

One way of implementing this requirement would be to devolve AAUs to the participant level. But this may not be the best way, owing to the complications that result from national eligibility criteria under the Kyoto Protocol such as the Commitment Period Reserve. Instead, a preferable option would be to keep ETS allowances and AAUs separate and to arrange a net transfer of AAUs between Member States at the end of the commitment period. The volume transferred would correspond to the net transfer of ETS allowances between participating Member States over the preceding four years.

Prior to 2008 , Member States do not have any AAUs available to transfer. There is a risk that a Member State that hosts net buyers of ETS allowances from other countries will make insufficient modifications to its national emission path, leaving it poorly placed for subsequent compliance with the Kyoto targets. This risk could be made worse by provisions for banking allowances into the commitment period. Banked allowances will allow higher emissions during the commitment period, but these emissions will not be backed by AAUs. Again, the compliance of a Member State which is a net buyer of banked allowances could be threatened. The options available to reduce this risk include: a) making a net transfer of AAUs in 2008, corresponding to the net transfer of allowances that occurred before 2008; or b) making it clear to ETS participants that the allocation of allowances in 2008 will be based upon stringent baseline standards, rather than current or historic emissions, thereby giving an incentive to make early reductions.

While ETS allowances should be kept separate from AAUs, there remains the possibility of trading interaction between the ETS and the Kyoto Mechanisms. For example, the proposed 'Linking Directive' for the EU ETS is designed to establish rules for the interface between the EU ETS and JI/CDM - but not to IET. JI/CDM credits are likely to be cheaper than EU ETS allowances, so any such links should reduce the cost of abatement in the EU. But there are concerns about the environmental integrity and additionality of JI/CDM credits, and many EU Member States may prefer to incentivise domestic abatement. The key 'linking' questions them become: a) whether to impose stricter criteria on the types of projects (*e.g.* sinks), which are eligible; and b) whether to impose ceilings on the volume of credits that can be imported (*i.e.* supplementarity by the back door).[9] The manner in which these questions are resolved will have important implications for both abatement costs within the ETS, and the future of the JI/CDM market -as well as the associated technology and revenue transfers to host countries.

The EU ETS also has important implications for JI projects in Accession countries. Many of these projects are at combustion installations which will need to join the EU ETS in 2005. Other projects affect electricity demand and hence indirectly interact with the EU ETS.

[8] Several models suggest that, with unrestricted trading, the international carbon price could fall to zero (KOKO).

[9] It would be much more difficult to impose different criteria for issues such as baselines and additionality.

Hence, the incentive to undertake JI projects in these countries may be undermined by the EU ETS, and existing JI projects may be subject to double counting problems.

5.9.3 Using one-way trading interaction to incentivise overcompliance

An interesting example of trading interaction is between schemes with tradable commodities with different denominations – e.g. between a carbon ETS (tCO_2e) and a Tradable Green Credit (TGC) scheme for renewable electricity (MWhe). This is possible because TGCs represent, in some part, displaced carbon emissions and hence can be converted to tCO_2e using a suitable conversion factor. Such links have been developed in the UK (Sorrell, 2003b) but have yet to be proposed for the EU ETS.

The flexibility of compliance with a TGC scheme could be improved through allowing full fungibility of trading commodities with an ETS, such that participants in the former could comply with their obligations by purchasing ETS allowances. But this approach ignores the long-term and non-CO_2 benefits of investment in renewables. Given that CO_2 abatement through renewables likely to be more costly than alternative options, the result would be a failure to meet the overall target for renewables deployment.

An alternative would be to adopt the approach currently used in the UK ETS and allow *one-way* fungibility. Participants who overcomplied with their individual TGC target could convert their surplus credits into carbon allowances and sell them into the ETS. But if the ETS included electricity generators, the conversion process would lead to double crediting. This is because the displaced fossil fuel generation will free up ETS allowances and create an equivalent volume of new allowances via the conversion process.

A rationale for one-way fungibility could be to encourage overcompliance with the TGC scheme. Without the link, the only incentives for *aggregate* overcompliance with the TGC targets are the ability to bank credits into the next period, together with the possibility of selling renewable electricity at premium prices to 'green' consumers. The ability to create carbon allowances through overcompliance creates an additional revenue stream which, in addition to the premium price for renewable electricity, may make overcompliance more economic. But given the high marginal abatement costs of renewables, this option is unlikely to be economic for the majority of renewable sources. Furthermore, there are more direct routes to encouraging greater renewables deployment, including increasing the TGC targets themselves.

In addition to poor economics, one-way fungibility raises some practical problems of carbon accounting. For example, the use of a fixed emissions factor for conversion creates problems of *discrepancy* between the actual and claimed emission reductions.

One alternative which has been proposed would be to separate the CO_2 and non-CO_2 'values' of the TGCs and trade them independently in separate markets, with only the first interfacing to the ETS (Morthorst, 2001). Participants in the TGC scheme would be required to purchase a certain quantity of both commodities to meet their obligation. The difficulty here is that, with the ETS in place, the CO_2 value of credit has already been partly reflected in the allowances 'freed up' by the displaced fossil fuel emissions. Creating a separate CO_2 value and trading this into the EU ETS would lead to two allowances being created for *all* the emissions displaced by the RO and EEC, rather than just from overcompliance.

In summary, linking a TGC scheme to an ETS creates a range of practical difficulties and may potentially threaten the environmental integrity of the ETS through the one-way double crediting. Since the marginal cost of carbon abatement through these instruments is likely to exceed the price of ETS allowances, there seems little to be gained in developing elaborate arrangements for linking these instruments in the near term.

5.10 Summary

This section has explored the interaction between GHG emissions trading schemes and other policy instruments in general terms. In particular, it has explored the problems associated with the double counting of emission reductions and the potential rationales for the coexistence of other policy instruments with a cap and trade ETS. The key points from each of these are summarised below.

5.10.1 General design issues and double counting problems

- There is a basic choice in the design of a cap and trade scheme for carbon emissions between an *upstream* design, targeted on fuel producers, and the *downstream* design, targeted on fuel users. Within downstream designs, there is a second choice between the direct and indirect treatment of the emissions from electricity generation. Each of these approaches has pros and cons and each has implications for incentives and abatement options. For reasons of political acceptability, downstream designs are more common in practice.
- Trading schemes impose *compliance obligations*, in that participants are required to surrender an allowance for a specified quantity of emissions. These obligations are separate from the *ownership* of allowances, in that (typically) anyone can own an allowance. Similarly, these obligations are separate from the *allocation* of allowances, in that (under some circumstances) allocations may be made to non-participants.
- Within an individual trading scheme, compliance obligations are normally clear. But problems may arise when attempts are made to: a) allow a single source to participate simultaneously in two different types of GHG trading schemes; or b) allow fuel, electricity or allowances to be traded between participants in two different types of trading scheme. The resulting disputes over compliance obligations may lead to: a) *double slippage*, where the coverage of emissions is lost; b) *double coverage*, where two allowances are surrendered for a one-tonne increase in physical emissions; and/or c) *double crediting*, where two allowances are generated or freed-up for a one-tonne decrease in physical emissions.
- Each type of problem introduces complexity into the regulatory situation. But it is important to distinguish between: a) situations where double coverage and double crediting are present simultaneously and where the first effectively cancels out the second; and b) situations where only double crediting is present and there is scope for inflation in the number of allowances. The second situation may threaten the environmental integrity of a trading scheme.
- A key result from economic theory is that the choice between the free allocation or auctioning of allowances should make no difference to the costs passed on in product prices. This is a particularly important result for the impact of the EU ETS on electricity prices. Free allocation allows participants to capture all of the economic rent, with no revenue been in available to compensate product consumers. However, compensation

may be achieved through allocating allowances to consumers, rather than trading scheme participants.

5.10.2 Rationales for the coexistence of an ETS with other instruments

- In many cases, it is possible to develop justifications for combining other instruments with a cap and trade ETS for carbon emissions. But these justifications raise both theoretical issues regarding the legitimacy of government intervention and empirical issues regarding the design of individual instruments. In many cases there will be trade-offs between long-term and/or non-efficiency objectives and short-term increases in abatement costs. If the policy mix is to gain legitimacy, these objectives and trade-offs need to be made explicit.
- A cap and trade scheme guarantees attainment of a particular emission target. Also, in the absence of market failures, it guarantees that the cap will be achieved at least cost. This implies that the use of a second instrument that directly or indirectly interacts with an ETS will increase the overall costs of meeting the emissions cap while at the same contributing nothing further to overall emission reductions (unless it is sufficiently stringent to make the cap redundant). This result applies both to instruments which directly affect CO_2 emissions from ETS participants, such as a carbon tax on fuel use, and to instruments which indirectly affect those emissions, such as a tax on electricity consumption of both participants and non-participants. As a result, once the ETS in place, coexisting instruments can no longer be justified through their contribution to overall emission reductions.
- Despite this, there may be legitimate grounds for introducing or maintaining other climate policy instruments that directly or indirectly interact with an ETS. These include:
  - improving the static efficiency of the ETS by overcoming market failures other than CO_2 externalities;
  - improving the dynamic efficiency of the ETS by overcoming market failures in the area of technology innovation and diffusion;
  - delivering social objectives other than efficiency, such as equity and political feasibility; and
  - compensating for deficiencies in the ETS design.
- These broad rationales may be used to justify the introduction or continuation of many climate policies that directly or indirectly interact with an ETS. However, the validity of such rationales is context specific and open to challenge. More specifically, the following rationales may be employed:
    - overcoming market failures inhibiting the adoption of energy efficient technologies;
    - overcoming market failures in the area of technology innovation and diffusion - particularly for renewable electricity;
    - mitigating allowance price uncertainty;
    - achieving supplementarity through ‘back-up’ regulations;
    - raising revenue and capturing windfall rent; and
    - achieving distributional objectives.
- It is also possible to justify *operational* interaction between an ETS and other instruments. Such combinations may frequently referred to as ‘hybrids’ or ‘packages’. Examples that are of particular interest include:
    - using taxes to penalise non-compliance;

    - using ‘hybrid’ tax/trading instruments to mitigate allowance price uncertainty;
    - using opt-in provisions to extend the scope of the ETS; and
    - using opt-out provisions to improve political acceptability.
- It similarly is possible to justify *sequencing* interaction between an ETS and other instruments. The two most relevant situations are:
    - using trading to increase the flexibility of the existing policy mix; and
    - using existing regulations as a basis for allowance allocation.
- Finally, it is possible to justify *trading* interaction between two trading schemes - normally referred to as *linking*. Such links will be governed by transfer and exchange rules which in combination will define the *fungibility* of the trading commodities. These rules will determine the scope for trading between the two schemes and the consequences of such trading. Generally, linking can reduce overall abatement costs, but in some circumstances it may threaten environmental integrity. The three most relevant types of trading interaction are:
    - ‘horizontal’ trading interaction between schemes in different countries;
    - ‘vertical’ trading interaction between national trading schemes and the Kyoto mechanisms; and
    - ‘one-way’ trading interaction between GHG trading schemes and tradable green credit schemes for renewable electricity.

6. Interaction of the EU ETS with UK climate policy

6.1 Introduction

This term provides an overview of the implications of the EU ETS for selected instruments within UK climate policy. It summarises the results of research that has been conducted by SPRU (Science and Technology Policy Research) as part of the INTERACT project. The section highlights a number of generic issues that are discussed in more detail in the UK case study reports.

The UK provides a particularly rich and complex example of policy interaction. The UK has developed an elaborate and interdependent mix of climate policies, including a pilot emissions trading scheme which is receiving international attention. This policy mix is established and is delivering real emission reductions, but much of it is incompatible with the EU ETS. The introduction of the Directive may lead to significant changes to UK policy before 2005, and a major overhaul by 2008. None of this was anticipated when the UK Climate Programme was developed and the conflicts that result highlight some fundamental issues within policy design.

6.2 Climate policy context

The UK has been a strong supporter of the Kyoto Protocol and has played a proactive role in international negotiations. The UK's target under the EU burden sharing agreement (-12.5%) is greater than the EU total (-8%) and the UK is one of the few Member States to be on course to meet its target. The relative ease with which the UK can meet its obligations has led it to take relatively little interest in the Kyoto mechanisms.

In addition to the burden sharing target, the UK has a domestic 'goal' of reducing CO_2 emissions to 20% below 1990 levels by 2010. The attainment of this goal now looks less likely, owing to a range of factors such as higher energy demand by households and problems with transport policy. In an Energy White Paper published in March 2003, the government endorsed the recommendation from the Royal Commission on Environmental Pollution that the UK should put itself on a path towards a 60% reduction in CO_2 emissions by 2050. While this is an important statement, the White Paper provided very little detail on new policies and mostly promised further rounds of consultation.

The UK's proactive stance on climate change derives from a declining trend in emissions during the 1990s, with CO_2 emissions in 2000 being some 8% less than in 1990. The bulk of these emission reductions result from the displacement of coal by gas in electricity generation and manufacturing. This large-scale fuel switching was driven by broader changes in the structure, governance, ownership and operation of the gas and electricity industries as a consequence of liberalisation. This process was facilitated in turn by low energy prices and the UK's self-sufficiency in fossil fuels. Fuel switching has allowed environmental

obligations to be met relatively easily, while consumers have benefited from substantial reductions in their energy bills.

This period is now at an end. Concerns about energy security have revived as the UK shifts to becoming a net importer of oil and gas. While the liberalisation process focused on minimising the cost of operating inherited assets, the challenge now is to stimulate large-scale investment in replacement assets in the absence of long-term contracts. The market driven windfall in carbon emissions is over and the retirement of nuclear capacity is likely to create severe difficulties for meeting emission targets beyond 2010. With the recognition that a 60% target requires a transformation of the systems that deliver energy services, energy policy is firmly back on the UK policy agenda.

The UK Programme for meeting its Kyoto obligations was introduced in November 2000. The Programme introduces a complex, elaborate and interdependent mix of policies that are intended to incentivise emission reductions across all sectors of the economy. These policies are designed to be consistent with other government objectives, notably shielding low income households from energy price increases. Most elements of the Programme are now operational, but the complexity of the policy mix has led to concerns over a 'policy glut' in the industrial sector. Also, the motivation to gain 'first mover advantage' in climate policy has led to difficulties as a result of subsequent incompatibilities with the EU ETS.

6.3 Selected UK climate policy instruments

A total of six UK policy instruments were selected for an examination of their potential interactions with the EU ETS. These were chosen on the basis of their relative importance and the extent to which they illustrate generic problems of policy interaction. The instruments are:

- *Climate Change Levy (CCL)*: A downstream, revenue neutral energy tax for business and the public sector.
- *Climate Change Agreements (CCAs):* Negotiated agreements for energy intensive industry which give facilities exemption from 80% of the CCL.
- *UK Emissions Trading Scheme (UK ETS)*: A voluntary, pilot trading scheme developed in collaboration with industry.
- *Integrated Pollution Prevention and Control (IPPC):* The UK implementation of the IPPC Directive, including provisions on energy efficiency.
- *Renewables Obligation (RO):* A tradable green credit scheme for renewable electricity, in which obligations to purchase renewable electricity are imposed upon electricity suppliers.
- *Energy Efficiency Commitment (EEC)*: An obligation upon electricity suppliers to invest in energy efficiency in the household sector.

The selected instruments are interlinked. For example, the CCAs provide exemption from CCL as well as forming part of the UK ETS. Similarly, there is trading interaction between the UK ETS, RO and EEC. The UK ETS itself is comprised of three elements: a) a voluntary cap & trade scheme, with participation incentivised by direct subsidy; b) a baseline and credit trading scheme for the CCAs; and c) a scheme for emission reduction projects. Table 1 lists these instruments and indicates the nature of their interaction with the EU ETS.

Table 6.1 The nature of the potential interaction between selected UK policy instruments and the EU ETS

Category	Instrument	Acronym	Direct	Indirect	Trading
Carbon/ energy taxes	Climate Change Levy	CCL	✓	✓	
Negotiated agreements	Climate Change Agreements	CCAs	✓	✓	✓
Emissions trading	UK Emissions Trading Scheme - cap & trade scheme	UK ETS (DPs)	✓	✓	✓
Emissions trading	UK Emissions Trading Scheme – project scheme	UK ETS (projects)	✓	✓	✓
Industrial pollution control	Integrated Pollution Prevention and Control Directive	IPPC	✓	✓	
Support for renewables	Renewables Obligation	RO		✓	✓
Promotion of energy efficiency	Energy Efficiency Commitment	EEC		✓	✓

Comprehensive analysis of the potential interactions between each of the above instruments and the EU ETS is provided in the two INTERACT project reports for the UK (see further reading). The following two sections provide a summary of this analysis for two of the instruments – the CCL/CCA package and the UK ETS. In each case the scope, objectives, timing and operation of the instruments are compared, policy options are identified and specific policy recommendations are provided.

6.4 Interaction between the EU ETS and the UK CCL/CCA package

The CCL and CCAs need to be analysed together as they form a package. The CCL is a downstream, revenue-neutral energy tax for business and the public sector. It is levied on coal, gas and electricity use, with oil products, CHP fuel and renewable electricity being exempt. The indirect treatment of electricity was chosen to avoid electricity price increases for low income households, while an energy tax was chosen over a carbon tax to protect the UK coal industry. Both decisions have influenced the entire shape of the UK climate programme and have created serious compatibility problems with the EU ETS.

The CCAs run until 2013 and give energy intensive industry exemption from 80% of the CCL, provided they take on binding targets for energy efficiency or carbon emissions. In practice, most sectors have adopted relative targets (e.g. energy use per unit of output), based upon a percentage of the estimated 'cost effective' energy efficiency potential. Targets are defined at two-year intervals up to 2010 and the penalty for failing to meet the targets is a return to paying 100% of the CCL. Eligible sites are those located in sectors which are regulated under IPPC and include many sites which lie below the IPPC size threshold.

Both the CCL and the CCAs directly interact with the EU ETS, and there is substantial indirect interaction in relation to electricity emissions. Since the CCAs incorporate baseline

and credit trading arrangements as part of the UK ETS, there is also scope for trading interaction.

6.4.1 Comparison of scope

The scope of both the CCAs and the EU ETS is based on that of the IPPC Directive, but there are important differences at four levels:

- *Sectoral coverage*: Differences in the sectoral coverage of the CCL, CCAs, IPPC and EU ETS suggest that individual sites in the public, commercial, manufacturing and energy sectors may face one of **ten** combinations of the four instruments.
- *Site coverage*: Differences in the coverage of individual technologies *within* an individual site expands the number of possible combinations of instrument coverage from ten to **eighteen.** The differences relate to the coverage of combustion, process and ancillary plant and to the size of the main combustion plant.
- *Emissions coverage*: Further complications are introduced by the differences in coverage of CO_2 versus other GHGs, combustion versus non-combustion CO_2 emissions, and combustion emissions from different fossil fuels.
- *Electricity coverage*: A final layer of complexity is provided by the differing incentives each instrument creates for reducing emissions from electricity generation. Particular complications are introduced by the inconsistent treatment of electricity from various renewable sources.

The net result is that introducing the EU ETS into the existing policy mix will entail administrative difficulties and raise complex issues of differential treatment and double regulation.

6.4.2 Comparison of objectives

The core objective of the CCL, CCAs and EU ETS is the same, but they differ in terms of their relative stringency and the importance they give to various subsidiary objectives.

The stringency of the EU ETS is at present unclear and the proposed allocation criteria include both top-down and bottom up elements which are potentially contradictory. But there is a possibility that the targets required under the EU ETS will be more stringent than those currently applicable under the CCAs, quite apart from the fact that these will be absolute rather than relative targets. In addition, the possibility of purchasing ‘hot air’ allowances from the UK ETS provides a low cost route to CCA compliance. This has important implications for either the use of CCA targets as a basis for allocation in the EU ETS, or the use of opt-out provisions within the EU ETS at the sector or installation level.

The design of the CCL/CCA package reflects multiple explicit and implicit objectives, including the desire to protect domestic consumers, energy intensive industry, and UK coal producers, together with promoting energy efficiency and avoiding a ‘windfall’ to nuclear generators. Each of these objectives is threatened by the introduction of the EU ETS. The Directive will disadvantage coal-fired electricity generation and accelerate its decline, raise electricity prices for household consumers, including the fuel poor, and improve the economics of nuclear power.

6.4.3 Comparison of timing

The EU ETS is in phase with the Kyoto commitment period, but is due to begin well before the CCAs end. In contrast, the CCAs extend beyond the end of the Kyoto commitment period, but targets are only negotiated up to 2010. The CCAs also include emissions trading provisions as part of the UK ETS, but at present this does not extend beyond 2006.

The situation is simplified by the inclusion of opt-out provisions in the EU ETS, as these may allow many of the existing CCAs to continue unchanged up to 2008. But since opt-outs require demonstration of equivalence of effort, UK electricity generators and oil refineries will need to join the scheme in 2005 since these have no 'equivalent' regulations. The inclusion of the electricity generators creates a host of problems for the CCL/CCA package, as a consequence of the double regulation of electricity and double counting of electricity emissions. Furthermore, it is far from clear that retaining the existing CCAs can be considered equivalent to participating in the EU ETS, and the absence of opt-out provisions after 2008 makes it inevitable that the CCL/CCA package will be substantially changed well before the planned end date of the CCAs.

6.4.3 Comparison of operation

Coexistence of the EU ETS with an unchanged CCL/CCA package creates a range of double regulation problems, which raise overall abatement costs and potentially introduce distortions to competition. These problems would be eased if eligible CCAs opted-out of Phase 1, but this would still leave double regulation of electricity. Fossil-fuel electricity generators will pass a portion of allowance costs onto electricity consumers, many of which are either subject to the CCL or signatories to CCAs. The consequences of this will depend in part upon the allowance price in the EU ETS. High prices (from a stringent cap) could lead to substantial economic impacts for the affected groups, while low prices (from a weak cap) could have a relatively small impact.

The impact of the EU ETS on electricity prices will also depend upon the carbon intensity of marginal generating plant on the system, which may be coal-fired for much of the year. If allowance costs are passed on in full to consumers, allowance prices as low as £5/tCO_2 could increase average electricity prices by as much as the current level of the CCL.

If both energy and allowance prices are low, there may be some appeal in retaining elements of the CCL/CCA package unchanged in order to maintain incentives to improve energy efficiency. This would reduce UK emissions and increase costs for UK participants, but the overall emissions covered by the EU ETS would be unchanged. Continuation of the CCL would also ensure that the revenue benefits of the tax are retained.

In the absence of allowance auctioning, there is no revenue-neutral fiscal mechanism to compensate consumers for electricity price rises. Participants in the EU ETS could be compensated by allocating allowances in proportion to electricity consumption and requiring the generators to buy these back. But this would not help non-participants as these are not allowed to receive allowances. If allowance prices are high, industry groups may step up campaigning against the CCL.

CCA facilities that have opted-out or are not eligible to join the EU ETS will face electricity price rises at the same time as having a target for their electricity consumption. This could

lead to pressure to modify the CCAs so that (as with the EU ETS) they cover direct emissions only. But the UK government's view is that price signals are less effective than downstream targets in incentivising electricity efficiency. If this is correct, such modifications would increase UK electricity consumption, although again the total emissions covered by the EU ETS would remain unchanged.

The participation of electricity generators in the EU ETS, combined with the continuation of the CCA trading provisions will lead to double counting of electricity emissions. These problems only result from increases above or reductions below the CCA targets and from changes in the emissions intensity of electricity use, which means that some emissions increases/reductions will be double counted and some not. Overall, this will not threaten the environmental integrity of either the EU ETS or the CCAs, but will introduce complexity into the policy mix as a result of a conflict over the compliance obligations for electricity emissions.

The use of relative targets in the CCAs means that trading links with the EU ETS could inflate the number of EU ETS allowances and violate the EU ETS cap. Such problems could be avoided through the use of a 'Gateway' arrangement to prevent net sales from the CCA sector.

6.4.4 Policy options

There are a range of options for modifying the CCL/CCA package, nearly all of which offer an improvement on the coexistence scenario judged against the evaluation criteria in Box 3.2. The main options for eligible CCA facilities during Phase 1 are to: a) join the EU ETS and terminate the CCAs; b) join the EU ETS but retain CCA targets on electricity consumption; or c) opt-out of the EU ETS and continue with the CCAs. Eligible facilities appear most likely to choose the third option, but both these and non-eligible facilities continuing with their existing CCAs would face double regulation of electricity. Similarly, non-CCA sites who continue to pay the CCL and EU ETS participants who continue with CCA targets on electricity would also face double regulation.

If double regulation proves unacceptable, the government could consider: first, modifying the CCL so that it applies to direct fuel use only; second, modifying the remaining CCAs so that they refer to direct emissions only; and third, dropping the electricity targets for EU ETS participants. There are benefits to be gained by going a step further and changing the CCL to a carbon tax and extending it to all downstream sectors and fuels. The main drawback is the loss of revenue, but this could be replaced through increasing the level of the tax.

Opt-outs make the EU ETS more acceptable to industry and certain Member State governments, but the disadvantages include reducing the environmental effectiveness of the scheme and increasing administrative costs. Differential treatment via opt-outs could distort competition either between or within Member States, while equivalence of effort could prove difficult to demonstrate owing to substantial differences in the scope, form and stringency of the CCAs and EU ETS. In particular, the CCAs primarily use relative targets (e.g. energy use per unit of output) while the EU ETS sets an absolute cap on CO2 emissions.

While a range of policy options are available, the basic choice is between, on the one hand, giving priority to economic efficiency by allowing the EU ETS to operate relatively unhindered; or on the other hand, giving priority to 'supplementarity' by retaining 'backup'

regulations to incentivise domestic abatement. The choice may depend upon expectations regarding EU ETS allowance prices, but these are speculative and depend in part on the interfaces between the EU ETS and the international carbon market after 2008.

6.4.5 Policy recommendations

- the CCL should be removed from electricity, extended to all downstream sectors and fossil fuels and changed from a energy tax to a carbon tax;
- eligible installations should join the EU ETS and their existing CCA agreements should be terminated;
- CCA facilities not eligible for the EU ETS should renegotiate their agreements such that the targets relate to fuel consumption only;
- participants in the EU ETS should be exempt from the CCL; and
- they should be no trading interaction between the CCAs and EU ETS.

6.5 Interaction between the EU ETS and the UK ETS direct participant scheme

The UK Emissions Trading Scheme (UK ETS) is a voluntary, pilot scheme, jointly developed by government and business, which began in January 2002 and is intended to run until 2006. The government is providing a total subsidy of £43m/year over five years as an inducement for companies to join the scheme and to adopt absolute emission targets. Electricity generators are excluded since the scheme uses indirect treatment of electricity, and participants continue to pay the CCL. The UK ETS allows for three forms of participation:

- *direct participants*: voluntary participation in a cap and trade scheme, encouraged by the financial incentive;
- *CCAs*: baseline and credit trading by companies with a CCA; and
- *projects*: generation of credits from emission reduction projects in the UK.

This section is confined to the direct participants,. There is a small degree of direct interaction between these and the installations eligible for the EU ETS, together with indirect interaction related to the treatment of electricity and the possibility of trading interaction.

6.5.1 Comparison of scope

Participation in the UK ETS is on a voluntary basis, subject to qualifying requirements. Thirty four companies have joined the scheme, securing annual emission reductions of 4MtCO_2e by 2006, over half of which is from non-CO_2 GHGs. Participants are from a diverse range of sectors and the nine largest companies are responsible for over 90% of the total reductions.

There is very little overlap between the direct participants and the installations eligible for the EU ETS. This is because first, most of the direct participants are in sectors which are not eligible for the EU ETS; and second, of those participants which are eligible, the emission sources covered by the UK ETS are mostly different from those covered by the EU ETS.

Exceptions include the non-combustion emissions from cement production and the emissions from >20MW combustion plant at those direct participant sites which are not already covered by a CCA. In other words, there is potential double regulation of only a proportion of direct emissions at less than 10% of the direct participant sites.

There is a more significant overlap in the emissions from electricity consumption at all the direct participant sites, since these are directly covered by the EU ETS and indirectly covered by the UK ETS. These emissions are subject to double regulation, with associated double counting.

6.5.2 Comparison of objectives

The UK ETS is both a voluntary scheme and a secondary element of the UKCP. In contrast, the EU ETS is intended to be mandatory and is considered essential for EU compliance with the Kyoto Protocol. The objectives in establishing a trading scheme are different for the UK and EU, in that the UK is well on course to meet its burden sharing target while the EU is heading for non-compliance.

The UK ETS was intended to provide the UK with an early mover advantage in emissions trading, with benefits such as learning by doing, accelerating institutional developments such as the Registry, and enabling the City of London to become an international centre for emissions trading. Similar 'soft' benefits are expected from Phase 1 of the EU ETS, although the Directive has the additional objective of avoiding distortions to competition. While the experience with the UK ETS may facilitate the implementation of the EU ETS, the incompatibilities between the two has led the UK to negotiate opt-out provisions. This means that many UK companies could be excluded from EU-wide trading in Phase 1, or at best be subject to trading restrictions.

6.5.3 Comparison of timing

The first period of the UK ETS ends in December 2006, and at present the government has made no commitment to further incentivised rounds. There is therefore a two-year overlap between Phase 1 of the EU ETS and the UK ETS. Delays in introducing the EU ETS could reduce this to one year or zero, although in the latter case Phase 1 may be abandoned altogether. If the UK ETS ends in 2006 and if most direct participants are unable to join the EU ETS until 2008, the learning experience gained through the UK ETS will be undermined. Conversely, if the UK ETS continues beyond 2006, it will remain a limited and isolated scheme unless trading links can be established with the EU ETS.

The large allowance surplus in the UK ETS suggests that allowances may be banked beyond 2006. If no trading links are established with the EU ETS, the value of these allowances will decline. Conversely, if the UK allows the banked allowances to be converted to AAUs, this could create an indirect link with the EU ETS and potentially threaten the UK's compliance with its Kyoto obligations.

6.5.4 Comparison of operation

Coexistence of the UK ETS with the EU ETS leads to double regulation of a small proportion of the direct emissions from UK ETS participants, since these are covered by both schemes. As Phase 1 opt-outs are allowed, these sites could choose to remain in the UK ETS and retain

their financial incentive but, since subsidised abatement is different from mandatory targets, there may be considerable difficulties in demonstrating equivalence of effort. The attractions of opting-out will depend upon a range of factors, including the fungibility of UK ETS and EU ETS allowances. If these sites chose not to opt-out (or were unable to), they would need to join the EU ETS and relinquish their financial incentive and UK ETS responsibilities, with a consequent (limited) effect on the remaining UK ETS market. This option may also involve splitting these installations into EU ETS and residual UK ETS components.

Coexistence of the two schemes also leads to double regulation of electricity for direct participants, analogous to that for the CCAs. Furthermore, since UK ETS participants continue to pay the CCL, there is effectively triple regulation of electricity at these sites. The economic consequences of this will depend upon trends in energy and allowance prices.

Coexistence also leads to the double counting of emissions from electricity generation. Since total emissions will remain less than or equal to the sum of the allowance caps in the two schemes, overall environmental integrity will be maintained. Nevertheless, the dispute over compliance obligations creates a confused situation, which will be made worse if there are trading links between the two schemes.

6.5.6 Policy options

The primary options are, first, to allow direct participants to opt-in to the EU ETS, and second, to allow fungibility between UK ETS and EU ETS allowances.

The advantages of opting-in include widening the scope of the EU ETS, increasing allowance supply, lowering allowance prices and bringing marginal abatement costs down (most direct participants would be net sellers). The disadvantages include increased administrative costs and the risk of injecting (possibly subsidised) hot air into the EU ETS. The motivation for opting-in is likely to be either low cost abatement through allowance purchase, or (more likely) higher prices for allowance sales. If the Commission wished to avoid double counting of electricity emissions, any opt-ins would need to be on the basis of direct emissions only. The incentive to opt-in to the EU ETS would also be increased if there were no fungibility between UK ETS and EU ETS allowances.

The pros and cons of trading interaction between the EU ETS and UK ETS are complicated by the uncertainties over timing and the complex structure of the UK scheme. Table 2 provides a summary of some relevant issues. Taken together, these may be sufficient to prevent any links between the two schemes.

The most likely outcome in practice is the prohibition of trading interaction and the postponement of opt-ins until Phase 2 of the scheme.

Table 6.2 Factors influencing the fungibility of UK ETS and EU ETS allowances

Factor	Issues
Allocation method	Direct participants have a competitive advantage through the financial incentive, but the majority do not compete with the sectors covered by the EU ETS. Also, the UK scheme was given state aid clearance and the relatively small number of direct participants may reduce equity concerns.
Absolute versus relative targets	To protect environmental integrity, a Gateway mechanism would be needed to govern trade between the CCAs with relative targets and the EU ETS. But no such restrictions are needed for trade with direct participants.
Coverage of GHGs	The EU would need to approve the UK monitoring protocols. As with the financial incentive, allowing direct participants, but not EU ETS participants, to credit non-CO_2 GHGs gives the former a competitive advantage. There may also be concerns regarding the potential 'hot air' associated with the non-CO_2 GHGs in the UK scheme.
Monitoring, reporting, verification	The protocols should be broadly compatible in the two schemes
Registry	The registries should be broadly compatible in the two schemes
Compliance	Statutory penalties are proposed for the UK scheme which are broadly equivalent to those in the EU ETS, while an additional incentive is provided by the resulting loss of the financial incentive. So this is unlikely to be an obstacle.
Banking	Both schemes allow unrestricted banking prior to 2008. The UK scheme restricts banking beyond 2008, but this is consistent with the EU ETS proposals.
Treatment of electricity	There is a conflict over the ownership of a small proportion of the emissions from electricity generation, with consequent problems of double counting. The overall environmental integrity of the two schemes is not threatened, but the situation creates some confusion.

6.4.7 Recommendations

- the UK direct participant scheme should cease in 2006, with no further incentivised rounds;
- trading between the direct participants and the EU ETS should not be allowed;
- further expansion of trading in the UK should be based upon opt-in provisions to the EU ETS (based on direct emissions only), together with sectoral expansion of the EU ETS; and
- restriction should be placed on the conversion of banked UK ETS allowances into AAUs.

6.6 Policy implications

The discussion in the previous two sections demonstrates that the implementation of the EU ETS in the UK raises some difficult questions in relation to double regulation, double counting, equivalence of effort, and the fungibility of trading commodities. Similar issues arise in relation to the other instruments listed in Table 1 and are described in detail in the UK case study reports. These tensions highlight some key choices within UK climate policy, including:

- the choice of policy objectives for each instrument;
- the choice between upstream and downstream policy instruments;
- the choice to protect the domestic consumer; and

- the choice to prioritise domestic abatement.

These are briefly described below.

6.6.1 The choice of policy objectives

In a cap & trade scheme, the total volume of emission reduction is set by the cap. Hence, any instrument that directly or indirectly interacts with the EU ETS will contribute nothing further to overall emission reductions. Furthermore, assuming perfect allowance and product markets, it will also raise the overall costs of meeting the cap. Hence, once the EU ETS is in place, such instruments can no longer be justified through their contribution to emission reductions. Instead, alternative rationales must be provided such as their contribution to non-efficiency objectives or to overcoming market failures other than externalities.

This makes the specification of policy objectives for each instrument all the more important. For example, support for renewables technology could be justified in relation to technology market failures but not in relation to the contribution of renewables to emission reductions. If objectives are clear, the costs, benefits and trade-offs can be made explicit. But the existing UK policy mix has instruments with multiple explicit and implicit objectives, of which contribution to overall emission reductions is typically the most important. As may be expected, these objectives have varying degrees of transparency and rationality.

6.6.2 The choice between upstream and downstream instruments

The EU ETS is a downstream scheme in which obligations are placed directly on fossil fuel users rather than indirectly on fossil fuel producers. Similarly, the EU ETS places obligations directly on electricity generators, rather than indirectly on electricity consumers. While there are pros and cons to each approach, the EU ETS has constrained future UK policy by making these choices. The UK cannot now introduce either an upstream carbon/energy tax or downstream instruments for electricity consumers without this leading to double regulation. This does not mean that such options are ruled out, but merely that the justification for such options must pay close attention to trade-offs between policy objectives and the consequences of policy interactions. For example, an upstream carbon/energy tax may be justified through the capture of windfall rent from allowance allocation or the maintenance of fiscal revenue, but this must be traded off against the resulting distortions in substitution incentives.

6.6.3 The choice to protect the domestic consumer

Most of the incompatibilities between the EU ETS and UK climate policy stem from the differing treatment of electricity. And the primary reason for this difference lies in the decision to protect low income households from increases in electricity prices. Since *all* households have been shielded from price rises in order to protect this vulnerable group, the UK government has created a fundamental tension between climate and social policy in this sector. The EU ETS makes this tension explicit and undermines the government's social policy objectives. It follows that the elimination of 'fuel poverty' is necessary both to curb emissions from the domestic sector and to rationalise climate policy for other sectors. A better approach would be to extend the CCL to the domestic sector whilst compensating fuel poor households directly.

6.6.4 The choice to prioritise domestic abatement

There is a tension between the UK's target of a 20% reduction in CO_2 emissions and the flexibility offered by International Emissions Trading (IET). If the UK achieved this target and either banked or sold the surplus AAUs, the environmental rationale for the target would be undermined. Conversely, a decision to 'retire' the AAUs would entail substantial opportunity costs. Under IET, this decision rests with the UK government. But under the EU ETS, decision rights for approximately one half of UK CO_2 emissions are allocated to private sector actors who can choose to trade allowances with other Member States. A decision to base the UK allocation under the EU ETS on the 20% target would not necessarily help in attaining this target because UK participants could simply purchase additional allowances (although it would increase the stringency of the overall EU cap). Instead, the only way to ensure that the emissions of UK participants are consistent with the 20% target would be to introduce additional 'backup' regulations that directly or indirectly affected their emissions. This in turn would distort the operation of the EU ETS, raise costs for UK participants, lower allowance prices and potentially introduce distortions to competition.

6.6.5 The way forward

The EU ETS presents a major challenge to UK climate policy and highlights issues that lie the heart of the domestic debate. These include the status of the 20% target, the appropriate treatment of electricity and the priority to be given to tackling fuel poverty. Both government and stakeholders have been slow in recognising this, but a vigorous debate is now underway.

In the long-term, it is clear that the EU ETS will trigger major changes in UK climate policy. If the transition is handled well, the final result should be a rationalised policy mix which offers advantages in terms of both efficiency and equity. If it is not handled well, the final result could be a policy mess.

6.7 Further Reading

Sorrell, S. (2002), *The Climate Confusion: Implications of the EU Emissions Trading Scheme for the UK Climate Change Levy and Climate Change Agreements*, SPRU (Science and Technology Policy), University Of Sussex, Brighton, Available from: http://www.sussex.ac.uk/spru/environment/research/ccfr.pdf

Sorrell, S. (2003), *Back to the Drawing Board: Implications of the EU Emissions Trading Scheme for UK Climate Policy*, SPRU (Science and Technology Policy), University Of Sussex, Brighton, Available from: http://www.sussex.ac.uk/spru/environment/research/drawingreport.pdf.

7. Interaction of the EU ETS with Dutch climate policy

7.1 Introduction

This section presents an overview of the implications of the proposed EU ETS for some selected energy and climate policy instruments in the Netherlands. It summarises the results of research that has been conducted by the Energy Research Centre of the Netherlands (ECN) as part of the INTERACT project.

7.2 Climate Policy context.

The Dutch target under the EU burden sharing agreement is to reduce GHG emissions by an average of 6% relative to 1990 levels by 2008-2012. In order to meet this target, the Dutch government launched a 'Climate Policy Implementation Plan (CPIP), consisting of two parts. Part I (1999) deals with domestic measures to mitigate GHG emissions, while Part II (2000) presents the initiatives that the Netherlands will be taking abroad by means of the Kyoto mechanisms. It was agreed that half of the required emissions reductions would be realised abroad. The other 50 percent will be achieved at home, of which about two-thirds will be realised by reducing CO_2-emissions and one-third by reducing other GHGs.

According to the most recent projections, total GHG-emissions in the Netherlands without implementation of the policy measures of the CPIP would amount to about 239MtCO_2e in 2010, while the Kyoto target corresponds to a limit of, on average, 199 MtCO_2e/year over the period 2008-2012. This implies that the total reduction assignment for the year 2010 is about 40 MtCO_2e. Following the CPIP principles mentioned above, this means that the domestic reduction target amounts to 20Mt CO_2e per year, of which 13-14MtCO_2e will be achieved through CO_2 reductions.

Besides the division between CO_2 and other GHGs, Part I of the PCIP specifies some other criteria with regard to the selection of policy instruments to reach the domestic GHG mitigation target. These criteria include that policy measures should be cost-effective, spread the effort in a balanced way across target groups, encourage structural changes which reduce CO_2, and allow target groups flexibility in the actions they take while assuring that results are achieved. These criteria have led to emphasis on negotiated agreements with target groups and market-oriented instruments such as fiscal incentives, subsidies and information programs.

7.3 Selected climate policy instruments in the Netherlands

A total of four policy instruments were selected for an exploration of their potential interactions with the EU ETS. These were chosen on the basis of their relative importance and their coverage of different target groups. The instruments include:

- The *Benchmarking Covenant* (BC): a negotiated agreement with energy-intensive industries in order to improve their energy efficiency.
- The *Regulatory Energy Tax* (REB): a tax on the consumption of gas and electricity, including the partial exemption from the tax for renewable electricity.
- The *Environmental Quality of Electricity Production* (MEP): a feed-in subsidy system for the producers of renewable electricity.
- The system of *Tradable Green Certificates* (TGCs): a system of guarantees of origin to promote renewable electricity, based on the partial exemption of the REB.

As the MEP, the TGCs and the exemption of the REB all serve the same purpose, i.e. encouraging renewable electricity, they have been grouped together as the 'Renewable Electricity Support System' (RESS) when exploring the potential interactions with the EU ETS. Table 1 lists the selected instruments and indicates the nature of their interaction with the EU ETS.

Table 7.1 The nature of the potential interaction between the EU ETS and selected policy instruments in the Netherlands

Category	Instrument	Acronym	Direct	Indirect	Trading
Negotiated agreements	Benchmarking Covenant	BC	✓	✓	
Carbon/energy taxes	Regulatory Energy Tax (levy on gas and electricity use)	REB		✓	
Support for renewables	Environmental Quality of Electricity Production (feed-in subsidy)	MEP		✓	
Support for renewables	Regulatory Energy Tax (reduced levy for green power)	REB		✓	
Support for renewables	Tradable Green Certificates	TGC		✓	✓

A comprehensive analysis of the potential interactions between each of the above instruments and the EU ETS is provided in the INTERACT project report for the Netherlands (see further reading). The following three sections provide a summary of this analysis. In each case the scope, objectives, and operation of the instruments are compared, policy options are identified and specific policy recommendations are provided. The final section deals with some general policy implications of the EU ETS for national climate policies.

7.4 Interaction between the EU ETS and the Benchmarking Covenant

The Benchmarking Covenant is a voluntary agreement, signed in July 1999 by the Dutch government and energy-intensive industry, including the electricity production sector. The central goal of the Benchmarking Covenant (BC) is to reduce GHG emissions from energy-intensive industries by improving their energy efficiency without compromising the international competitiveness of these industries. According to the BC, participating

industries are required to become close to world best practice in terms of energy efficiency as soon as possible, but no later than 2012. In return, the government will refrain from implementing additional specific national measures aimed at further reducing energy use or CO_2 emissions by these industries.

7.4.1 The scope of the instruments

In terms of sectoral coverage (notably of companies involved) there is a high degree of overlap between the major target groups of the EU ETS and the BC. Nevertheless, there are a few companies (with a relatively large number of installations) that have joined the BC but which are not covered by the EU ETS. On the other hand, there are several companies which are subject to the EU ETS but which do not participate in the BC (although most of these companies have signed alternative Long-Term Agreements on energy efficiency)

7.4.2 The objectives of the instruments

There is a high degree of overlap and synergy between the primary objectives of the two instruments, i.e. improving energy efficiency (BC) versus mitigating CO_2 emissions cost effectively (EU ETS). Although improving energy efficiency and reducing CO_2 emissions usually converge in the same direction, there are some cases in which these objectives may diverge or even conflict. In addition to a situation of growing output (in which energy efficiency per unit of production may improve while CO_2 emissions may increase), these cases refer particularly to changes in fuel mix as well as to those situations in which the coverage of the emissions/energy sources differ between the BC and the EU ETS. These differences relate to: (i) direct versus indirect emissions; (ii) energetic versus non-energetic emissions; and (iii) energy/emissions from waste, biomass or non-fossil sources. In all these cases, the objectives of improving energy efficiency (BC) and reducing CO_2 emissions (EU ETS) may not only move at different rates but also in different directions.

7.4.3 The operation of the instruments

The interaction between the EU ETS and the BC raises a variety of issues, including: (i) the impact of the EU ETS on electricity prices; (ii) the impact of the EU ETS on generating heat and power; and (iii) whether the BC could be used as a basis for the allocation of EU ETS allowances. These issues are briefly summarised below

The impact of the EU ETS on electricity prices
The EU ETS may have a significant impact on the price of electricity, which, in turn, may have a significant, although opposing impact on the two major sectors covered by the Benchmarking Covenant, i.e. the power producers versus energy-intensive industries. By means of a numerical example, it is shown that emissions trading at an allowance price of €10/tCO_2 may lead to an increase of the electricity price in 2010 by 0.42 €cent/kWh. Based on a commodity or producer cost price of 2.7 €cent/kWh before emissions trading, this implies an increase of that price of some 15 percent due to the EU ETS.

If the EU ETS will indeed result in an increase in average electricity prices of 0.42 €cent/kWh, it will have a significant impact on the two major sectors covered by the Benchmarking Covenant. In case of free allocation of allowances, more than €400 million of economic rent will accrue to the power sector, while energy intensive industries that compete on global markets will not be able to pass on increases in electricity prices to their customers. As a result, the output of these industries may decline when the electricity price is raised.

The impact of higher electricity prices on energy-intensive industries could, in theory, be relieved by auctioning allowances to the power sector and channelling a part of the auction revenues to the (large-scale) consumers of electricity. Another option to compensate energy-intensive industries for the higher electricity prices is to allocate free allowances for the generation of power to end-users rather than directly to the electricity producers. These industrial end-users could sell these allowances (to the power producers), thereby generating revenue to compensate for the increase in electricity prices.

The impact of the EU ETS on generating heat/power
An interesting interaction issue between the EU ETS and the Benchmarking Covenant concerns the treatment of energy use and concomitant emissions due to the generation of off-site heat and power, including combined heat and power (CHP). In a direct (downstream) emissions trading system such as the EU ETS, emissions due to the generation of heat/power are attributed to heat/power producers. The Benchmarking Covenant, on the contrary, is based on an indirect approach of energy use and concomitant emissions, in which the emissions of power/heat are attributed to the end-users.

Whereas the indirect approach of the Benchmarking Covenant encourages energy efficiency, the direct approach of the EU ETS may lead to sub-optimal shifts in energy use in cases where electricity or heat can be substituted for fuel. For industry, replacing direct fuel consumption by purchased heat or electricity might be an attractive way to retain allowances for selling on the market. This would occur particularly if electricity and heat prices do not adequately reflect emission costs, e.g. because of fierce competition and ample allocation of free allowances in the energy sector.

The Benchmarking Covenant as a basis for allocating EU ETS allowances
A major interaction issue concerns the question of whether the BC could be used as a basis for allocating EU ETS allowances. The advantages of such an approach are that it fits well with the existing climate policies in the Netherlands, it would meet several of the allocation criteria specified in Annex III of the EU ETS Directive, and that it increases the political acceptability of the EU ETS among the participants of the BC.

However, allocation of allowances based on the Benchmarking Covenant is likely to imply that the socio-economic benefits of emissions trading in the Netherlands will be relatively low. Moreover, the conversion of energy efficiency benchmarks into CO_2 emission quotas raises a variety of practical implementation issues which may lead to high information and transaction costs. Overall, in a multi-criteria assessment, the coexistence of the EU ETS and the BC, notably when the allocation of the emission allowances is based on the BC, scores relatively high in terms of industrial competitiveness and political acceptability, but relatively low in terms of economic efficiency and administrative simplicity.

7.4.4 Policy options

In order to improve the interaction between the BC and the EU ETS, several policy options have been considered, including:

1. Relieving BC restrictions on EU ETS.
2. Using alternative allocation rules.
3. Auctioning of EU ETS allowances.
4. Allocating allowances to electricity end-users.

5. Tightening the EU ETS cap to participating sectors.
6. Abolishing the BC when the EU ETS is introduced.
7. Mixing the previous options.

Base on a multi-criteria assessment, it turns out that each option scores higher than the baseline option (i.e. the coexistence scenario of the EU ETS and BC alongside each other, with allocation based on the BC). Option 7, i.e. a mixture of options 2-6, shows the best policy performance.

7.4.5 Policy recommendations

- The costs of emissions trading should be reflected in the price of electricity and heat. This could be achieved by either granting a limited amount of free allowances to the energy sector (so that additional allowances have to be bought at an auction or market) or by allocating the allowances for generating power/heat to the industrial end-users rather than the energy sector, which remains responsible for surrendering allowances for their direct emissions (so that the energy sector has to buy these allowances from the industrial end-users). The latter opportunity would also compensate these users for the higher energy prices, thereby protecting their competitive position.
- Regardless the method of allocating allowances, the Benchmarking Covenant should be abolished once the EU ETS becomes operational, since there are no convincing reasons to continue the existence of the BC alongside the EU ETS.

7.5 Interaction between the EU ETS and the Regulatory Energy Tax

The Regulatory Energy Tax (REB, after its Dutch acronym) was introduced in 1996, mainly as a levy on the use of gas and electricity by households and small-scale industry. The revenues from the REB have been mainly used to reduce other taxes and social premiums imposed largely on households and small firms (i.e. the so-called ‘greening of the fiscal system’).

7.5.1 The scope of the instruments

There is hardly any overlap or interaction between the direct target groups of the EU ETS and the REB. The groups directly affected by the EU ETS consist exclusively of large energy users, while the REB is imposed predominantly on the consumption of fossil electricity and gas by small and medium-scale energy users (including households and firms). However, there are some major interactions between the indirect target groups of these instruments. For instance, the group of small and medium-scale fossil energy users is affected directly by the REB (through taxation of conventional energy use) and indirectly by the EU ETS (through higher prices resulting from CO_2 abatement costs). Hence, this group will be subject to double regulation and may be charged double, depending on whether and to what extent the EU ETS results in higher consumer prices for fossil electricity

7.5.2 The objectives of the instruments

Although the EU ETS and the Dutch ecotax are predominantly focused on different direct target groups, there is a major overlap or synergy between the objectives of these instruments. The EU ETS is primarily aimed at reducing CO_2 emissions, thereby indirectly encouraging the saving of fossil fuel use in general and the switch to renewable energy in particular. On the other hand, both the primary objective of the REB to encourage the saving of fossil energy use in general and its additional objective to promote the switch to renewable energy consumption contribute to the objective of reducing CO_2 emissions.

7.5.3 The operation of the instruments

The interaction between the operation of the EU ETS and REB concerns particularly the consumption of one commodity, i.e. electricity generated from fossil resources. Due to this interaction small-scale electricity consumers are subject to 'double regulation' or 'double charging' in the sense that they, on the one hand, have to pay a relatively high REB tariff (including some carbon taxation) and, on the other hand, pay higher electricity prices due to the EU ETS (including some internalised costs of carbon reduction).

7.5.4 Policy options

A multi-criteria assessment of the coexistence of the EU ETS and an unchanged REB scores relatively low with regard to economic efficiency, social equity and political acceptability (particularly when the price of an emission allowance becomes high). This assessment provides the starting point for considering should alternative policy options that might improve the overall performance of the interaction between the EU ETS and the REB. These options include:

1. Reducing the double regulation of the EU ETS and the REB on electricity use, either by reducing the REB on electricity (option 1a) or by abolishing it completely (option 1b).
2. Improving the social equity of the REB by expanding its sectoral coverage.

The overall performance of option 1a is higher than that of the coexistence scenario, but the performance of options 1b and 2 are lower. In particular, the performance of option 2 is poor. The major reason for this is that the environmental effectiveness of an energy or carbon tax on *national* CO_2 emission levels by the participating sectors will be zero as these levels are fixed by the national emission quota (although it may affect the *domestic* emissions and, hence, the emissions trading by these sectors).[10] This finding is also relevant to the ongoing discussion on implementing a carbon or energy tax throughout the EU. Although the ultimate judgement over such an ecotax depends on its specific purposes and characteristics (including its sectoral coverage), such a tax cannot be recommended on grounds of cost-effectiveness if it is mainly aimed at reducing CO_2 emissions by sectors participating in the EU ETS (including electricity generation).

7.5.5 Policy recommendations

- If the EU ETS results in higher electricity prices the REB on electricity consumption by small-scale end-users could be proportionally reduced to avoid double regulation.

[10] National emissions are distinguished from domestic emissions in that the former are equal to domestic emissions corrected for emission trading through either the EU ETS or one of the Kyoto mechanisms.

- Energy users should pay for carbon emissions, whether through taxation or emissions trading. For each target group, only a single instrument should be used for carbon pricing. Therefore, sectors participating in the EU ETS should not be subject to national or EU carbon/energy taxation.

7.6. Interaction between the EU ETS and renewable energy support policies

Recently, the Dutch system of supporting renewable electricity has been drastically reformed. Starting from mid-2003, the major elements of the new system of supporting renewable electricity includes:

- *The MEP feed-in subsidy.* The essence of the MEP is to stimulate the environmental quality of generating electricity, notably by granting a subsidy to domestic producers of renewable electricity for each kWh fed into the grid.
- *The ecotax benefit.* Starting from mid-2003, the REB tariff on renewable electricity will be set at 3.49 €cent per kWh, compared to 6.39 €c/kWh for grey electricity, implying that the support due to the differentiation of REB rates on grey versus green electricity will amount to 2.9 €c/kWh.
- *The green certificate system.* In the Netherlands, the green certificate system serves to facilitate the operation of a renewable electricity market based primarily on the promotion of a voluntary demand for green power. This demand is encouraged through the ecotax reduction on renewable electricity. The tax reduction, however, can only be claimed by the energy supplier if he surrenders to the tax authority an amount of green certificates corresponding to the amount of renewable electricity delivered to a green power consumer. Hence, in the Dutch system, there is a close link between the green certificate scheme and the ecotax incentive for renewable electricity.

7.6.2 The scope of the instruments

There is no overlap or interaction between the *direct* target groups of the EU ETS and the Dutch renewable support system. The EU ETS directly targets large fossil fuel users, including electricity generators, while the direct target groups of the Dutch renewable support system comprise, on the one hand, renewable electricity producers (through both the MEP and TGCs) and, on the other hand, renewable electricity consumers (through the ecotax benefit). However, the *indirect* interactions between the target groups of the EU ETS and the Dutch renewable support system are manifold, significant and complex.

7.6.3 The objectives of the instruments

Although the EU ETS and the Dutch support system for renewable electricity are focused on different target groups, there is a major overlap or synergy between the objectives of these instruments The EU ETS is primarily aimed at reducing CO2 emissions, thereby indirectly encouraging the saving of fossil fuel use in general and the switch to renewable energy in particular. On the other hand, the Dutch support system for renewable electricity is primarily aimed at promoting the use of renewable electricity.

Nevertheless, once the EU ETS becomes operational, renewable energy policies could, in principle, be abolished from a static CO_2 efficiency point of view as the EU ETS will realise the CO_2 target of the participating sectors at the lowest costs. However, there are other reasons to justify renewable energy policies within the context of the EU ETS. Perhaps the most important argument for supporting renewable technologies within the context of CO_2 mitigation is that a widespread diffusion of these technologies may result in a substantial fall in the costs of renewable energy and, hence, in meeting major cutbacks in CO_2 emissions at affordable costs (i.e. the so-called dynamic CO_2 efficiency argument).

7.6.4 The operation of the instruments

Although renewable energy policies should be accounted for when setting the national quota under the EU ETS, the Directive opts for a formal separation between the markets for green certificates and emission allowances, i.e. green certificates cannot be converted to emission allowances (or vice versa) and, subsequently, traded among each other. Nevertheless, despite this formal separation between the markets for green certificates and emission allowances, in practice there will be all kinds of linkages and interactions between these markets, running through the intermediate power market Based on a detailed analysis of the Dutch situation, it is concluded that the operational linkages and interactions between emissions trading and renewable energy policies in general, and between the markets for power, green certificates and emission allowances in particular, are quite intricate and sometimes complicated. Overall, however, there seem to be no major problems or conflicts between the operation of the EU ETS and the Dutch support policies for renewable electricity. On the contrary, the operation of the instruments seems to be mutually reinforcing in the sense that obtaining the operational target of one instrument enforces the achievement of the target of the other. The only problem might be the double or over-stimulation of existing MEP producers due to the interaction of the EU ETS and the Dutch system for supporting renewable electricity.

7.6.4 Policy options

Nevertheless, the recently introduced renewables support system in the Netherlands is still subject to political discussion and there is a need to harmonise it with ongoing developments of similar policies elsewhere in the EU. Therefore, four alternative policy options have been considered:

1. Reducing the double regulation of existing MEP producers.
2. Abolishing the REB support while raising the MEP support proportionally.
3. Introducing an obligatory quota system for renewable electricity.
4. Encouraging one-way trading between green certificates and emission allowances.

The overall performance of options 1-3 do not deviate significantly from the multi-criteria assessment of the coexistence scenario (i.e. the baseline option of the EU ETS and the Dutch renewable electricity support system in their present form). The performance of option 4, however, is quite poor. Allowing one-way trading between green certificates and emission allowances does not serve any real purpose that could be achieved better by other, more sensible means, while it creates a variety of problems, notably double crediting, which undermines the environmental effectiveness and integrity of the EU ETS. Moreover, the present study has shown that there will already be a positive, mutually reinforcing interaction between the objectives of the EU ETS and renewable energy policies in general and between the operation of the markets for emission allowances and green certificates in particular,

despite (or perhaps, owing to) the formal separation of these markets proposed by the Directive on the EU ETS. Therefore, the option of allowing one-way trading should be rejected, while the option of the EU ETS Directive to introduce a formal separation between the markets for green certificates and emission allowances should be supported.

7.6.5 Policy recommendations

1. When determining the MEP feed-in subsidies to renewable electricity producers for a period of 10 years, the potential impact of the EU ETS on electricity prices should be explicitly considered.
2. The market for green certificates and emission allowances should be formally separated.

7.7. Policy implications

Within the context of the EU ETS, it is important to distinguish national energy policies that affect fossil fuel use (and, hence, CO_2 emissions) by the participating sectors versus the non-participating sectors because the effectiveness and the justification of these two set of policies changes once the EU ETS becomes operational. If a country joining the EU ETS has set a certain reduction target for its non-participating sectors, then national policies affecting fossil fuel use by these sectors are both necessary, effective and justified in order to control the emissions of these sectors and, hence, to meet the Kyoto commitments. On the other hand, in the absence of market failures, national policies affecting the fossil fuel use of its participating sectors are neither necessary, neither effective, nor justified to control the CO_2 emissions of these sectors in the most efficient way.

The latter statement with regard to energy policies affecting the participating sectors is based on the following two considerations:

1. Policies affecting fossil fuel use of participating sectors do influence the *domestic* CO_2 emissions of these sectors, but not the *national* emissions accounts of these sectors or the country as a whole as the national cap or quota of emission allowances allocated to these sectors is fixed. Hence, any change in the domestic emissions by these sectors is compensated by a similar change in emissions traded by these sectors.
2. The operation of the EU ETS results in a situation in which the primary environmental objective of the scheme (i.e. the emissions cap or quota) is achieved at the lowest costs by the participants themselves as it encourages these participants to adjust their abatement options and emissions trading opportunities until the marginal abatement costs throughout the scheme are equal to the international clearing price of an emission allowance.

As a result, within the context of the EU ETS, national policies affecting fossil fuel use by participating sectors will lead to (i) less CO_2 efficiency, i.e. raising abatement costs without enhancing overall CO_2 reductions, and (ii) less optimal market operations within the EU ETS, i.e. less demand for emission allowances and/or more supply of these allowances, resulting in a declining price of an allowance. This process may continue until the scarcity on the market for emission allowances evaporates fully and the price becomes zero. Therefore, from the perspective of CO_2 efficiency, the coexistence of the EU ETS and policies affecting fossil fuel use by participating sectors is hard to justify and, hence, these policies could be considered to be redundant and ready to be abolished.

However, there are three reasons that may justify the coexistence of the EU ETS and other policies affecting the fossil fuel use of participating sectors. Firstly, a major justification for this coexistence is that using, incorporating or accounting for these other policies may improve the design and implementation of the EU ETS and, hence, may lead to an improvement of its operation or political acceptability. A major example is to use existing direct regulations or negotiated agreements as the basis for the allocation of the emission allowances. In this case, however, the regulations or agreements would need to be removed once the EU ETS becomes operational in order to ensure optimal emissions trading.

Secondly, correcting for market failures is another reason that may justify the coexistence of the EU ETS and other policies affecting the fossil fuel use of participating sectors. The findings above on the CO_2 efficiency of the EU ETS are based on the assumption of a perfect economy with no (policy) distortions or other market failures. In practice, however, there are a variety of cases in which market failures lead to a loss in energy/CO_2 efficiency, either in a static or a dynamic sense. In such cases, the EU ETS may be jointly used by other policy instruments – such as subsidies on energy savings, awareness campaigns, or support to renewables – in order to overcome these market failures. If these other policies are well designed, i.e. pass a cost-benefit test, they may result in an overall improvement in static or dynamic efficiency.

A final reason to justify the coexistence of the EU ETS and other policies affecting the fuel use and CO_2 emissions of participating sectors is that these policies may serve to meet a variety of other policy objectives besides achieving CO_2 efficiency such as (i) raising fiscal resources, (ii) serving equity purposes, (iii) preventing other environmental effects besides CO_2 emissions, or (iv) improving security of supply.

However, policies complementary to the EU ETS may at best improve the efficiency of CO_2 abatement (in case of market failures), but not the effectiveness of CO_2 mitigation (as the amount of CO_2 reductions is fixed by the cap on CO_2 emissions). Or, to put it more bluntly, *once the EU ETS becomes operational, the effectiveness of all other policies to reduce CO_2 emissions of the participating sectors becomes zero.*

Moreover, the socio-political acceptability of meeting other objectives besides CO_2 mitigation may change once it is realised that the relatively high costs of some of these policies can no longer be justified by CO_2 objectives but only by other considerations such as less NO_x emissions, more rural employment or an improved energy supply security. Therefore, whatever these other considerations might be, it will be obvious that the evaluation of the costs and benefits of national policies affecting fossil fuel use by participating sectors will change once the EU ETS becomes operational. This may have far-reaching implications for these policies, including a major reform or, in some cases, even an abolition of these policies.

Finally, in practice, there are likely a variety of sound and less sound reasons why most of the existing policies affecting the fossil fuel use of participating sectors will be continued even after the EU ETS becomes operational, notably in the short term. As noted, some of these policies, if well designed, may lead to an improvement of the operation or political acceptability of the EU ETS, or even to an improvement of its CO_2 efficiency in cases of correcting market failures adequately. However, except these latter cases, all other policies affecting the fossil fuel use of participating sectors will reduce the efficiency gains, or assumed cost benefits, of the EU ETS. The supposed cost benefits of emissions trading, by

both policy makers and policy analysts, are usually based on studies or models that implicitly assume the absence of using joint, complementary policies. In practice, however, a variety of other, complementary policies besides emissions trading will be used, for both sound and less sound reasons. This implies, however, that actual cost benefits of emissions trading will be less as, in general, you can not have simultaneously the (assumed) benefits of both emissions trading and other policies affecting the fossil fuel use of participating sectors.

7.8 Further Reading

Sijm, J., and A. van Dril (2003), *The Interaction between the EU Emissions Trading Scheme and Energy Policy Instruments in the Netherlands – Implications of the EU Directive for Dutch Climate Policies*, ECN-I--03-060, Centre of the Netherlands (ECN), Petten/Amsterdam, available from: http://www.sussex.ac.uk/spru/environment/research/interact.html

Sijm, J. (2003), 'The Interaction between the EU Emissions Trading Scheme and National Energy Policies: A general framework', *Climate Policy*, forthcoming.

8. Interaction of the EU ETS with German climate policy

8.1 Introduction

This policy brief presents an overview of the implications of the proposed EU ETS for some selected energy and climate policy instruments in Germany. It summarises the results of research that has been conducted by the Fraunhofer Institute for Systems and Innovation Research (ISI), as part of the INTERACT project.

The interaction between the proposed EU ETS and the following three German climate policy instruments was analysed:

- Voluntary Agreements tackling Climate Change (CCA),
- the Eco Tax, and
- the Renewable Energy Act (REA).

In each case, an initial interaction analysis has been performed according to the methodology set out in section 4.5. Based on the analysis of interactions between the EU ETS and the existing instruments, an analysis of policy options has been performed in order to reveal institutional arrangements which can significantly change the outcome of the interaction. The interaction is evaluated using the criteria listed in Box 3.2.

8.2 Climate policy context

The German Kyoto target of a 21% reduction in GHG emissions below 1990 levels is the second highest in the EU. In addition, Germany has a national target of a 25 % reduction in CO_2 emissions from 1990 levels by 2005. Projections suggest that both targets will be met, but without much headroom. The biggest contribution will come from energy supply. In 2002, CO_2 emissions were 15% below 1990 levels, largely as a result of the deindustrialisation in East Germany following reunification ('wallfall' profits)

Germany has developed a comprehensive strategy for reducing GHG emissions. Measures include an energy tax introduced in April 1999, revisions to sector negotiated agreements in 2000 (giving an 80% exemption from the tax), a fixed buyback rate for renewable electricity, promotion of CHP, and measures for N_2O and methane. After the federal election in September 2002, the Social Democrat and Green coalition introduced a number of important policy changes including a shift to supporting the EU ETS (subject to a range of conditions), changes to the energy tax (including the removal of certain exemptions), and changes in renewables policy, following its shift to the Federal Ministry for the Environment.

A secretariat was founded in January 2001 to explore the potential development of a German emissions trading scheme. This reported in December 2001, but was subsequently eclipsed by the development of the EU ETS.

8.3 Interaction between the EU ETS and Climate Change Agreements

Voluntary agreements play a prominent role in Germany for the industrial sector. The first agreements tackling Climate Change were made by industrial associations in 1995 and 1996 and renewed in 2001. In addition to the interaction analysis under existing instrument arrangements, two policy options have been developed:

- *Option 1*: Replacing voluntary agreements, but building on them by adopting their targets as a basis for allocation.
- *Option 2*: Pooling activities under the EU ETS, whereby the pools could be mandatory or voluntary. This option was introduced by the German government in the negotiations over the EU ETS.

As they are currently proposed, the EU ETS and the CCAs a pair very unlikely to operate in parallel, since this would result in an acceptable double-regulation. Furthermore, there are incompatibilities arising from incentive setting and sanctions.

Compared to interaction under existing arrangements, both Option 1 and 2 leads to a lower environmental effectiveness. Option 1, which is based on the targets of the CCA, is much more realistic than the introduction of mandatory pools as described under Option 2. Voluntary pools might have a chance only if the costs for negotiating the allocation for single installations are assumed to be higher than the benefits from selling allowances.

8.4 Interaction between the EU ETS and the Eco Tax

The analysis of EU ETS and the **Eco Tax** covers the interaction for the instruments as a pair under arrangements before 2003 and for three policy options:

- *Option 1*, which has been implemented in 2003, increases the tax rate for industry and designs a new preferential treatment for very energy-intensive companies.
- *Option 2* is designed to reduce double regulation and exempts EU ETS-installations from the Eco Tax.
- *Option 3* aims to achieve a greater equivalence of effort within industry. A number of design variables are altered for this policy option, especially changing the tax box of the Eco Tax and linking the tax rate to the results of emissions trading.

The results of the different cases revealed the following picture:

- The interaction under instrument arrangements before and since 2003 (Option 1) lead to **double regulation**. Double regulation at the installation level is phased out in Options 2 and 3. However, at an institutional level, the operators of installations remain subject to the Eco Tax for non-ETS installations.
- Summing up the different effects on **environmental effectiveness**, Option 2 and 3 seem to reduce the stringency of the policy.

- With the exception of Option 3, all cases result in different marginal costs within industry. Despite the double regulation of the instruments (interaction under existing arrangements before and since 2003), it can even be argued that, due to the interaction, the marginal costs of EU ETS installations might approach those of the remaining sectors which are subject to the Eco Tax only.
- All cases may lead to problems of **equity**. However, no clear picture emerges for the effects within industry.
- Option 2 and 3 would lead to several difficulties in implementation.
- In addition to CO_2 reduction, the Eco Tax can be justified through additional **environmental policy goals**. Furthermore, the Eco Tax is justified through the objective of raising revenue to lower the cost of labour in order to increase **employment**.

8.5 Interaction between the EU-ETS and the Renewable Energy Act

The analysis of EU ETS and the **Renewable Energy Act (REA)** covers the interaction for the instruments as a pair under existing arrangements and three policy options:

- *Option 1*: a provision that an investment in RES from an ETS participant would lead to a cancellation of allowances.
- *Option 2*: the feed-in prices are reduced for investors who are participants in the ETS.
- *Option 3:* the feed-in prices for all investors are reduced.

The following results of the interaction analysis are especially important:

- The greatest **environmental effectiveness** is achieved in the interaction under existing instrument arrangements.
- The evaluation of the **static economic efficiency** depends whether or not the avoided costs of the reduction in non-GHG emissions are taken into account. If only internal costs are considered, a shift towards RES generally increases the marginal costs. Thus, interaction under existing instrument arrangements would have the lowest static efficiency. If the ancillary environmental benefits of RES are monetised, however, interaction under existing arrangements might be even more efficient than Option 3.
- It can be argued that the interaction under existing arrangements is likely to improve the **dynamic efficiency** for RES because it seems to combine a strong incentive to establish market niches and direct learning processes with a strong incentive to create a mass market and to bring in the additional resources of the utilities to exploit the market.
- All three policy options make the **implementation** of the instruments more complex and increase administrative costs.
- To a certain extent, the **political acceptability** mirrors the conflicts often seen in environmental policy: the interest of environmental groups together with an evolving industry of rather small and new enterprises are up against the interest of the incumbents consisting of well established and larger enterprises. Within industry, the acceptability depends on the specific equity effects.

- To a certain extent, the **overall evaluation** of the different options indicates a trade-off between static economic efficiency on the one hand (if the external costs of ancillary benefits and transactions costs are not taken into account) and environmental effectiveness, administrative simplicity, and perhaps dynamic efficiency on the other hand.

In addition to CO_2 reduction alone, the Renewable Policy act can be justified through additional **policy goals**, such as reduction in air pollutants, or less dependence on non-renewable resources.

8.6 Policy implications

Different policy conclusions can be drawn from the analysis. The following aspects are relevant in a **short term perspective**:

- The political economy of climate change suggests that Option 1 of the interaction between EU ETS and CCA (adopting CCA targets as a basis for allocation) might be attractive. However, there are some difficulties in implementation.
- For the interaction between EU ETS and Eco Tax, Option 1 (higher tax rates with less pronounced preferential treatment) seems to be the preferred short-term option, especially as long as there are relative weak targets within the allocation plan.
- For the interaction between EU ETS and REA, the instruments interacting under existing arrangements could be a likely outcome. Otherwise, there would be a need for a separate strong policy to ensure the political target of doubling RES.

In the **long run**, however, different conclusions might prevail. The following perspectives might evolve for policy making, especially if the different interaction options are looked at simultaneously:

- If strict targets are set within the allocation plan, a tax exemption or reduced eco tax rates for EU-ETS installations could be an interesting option.
- Strict targets in the allocation plan could be derived by using a Best Available Technology (BAT) benchmark approach. In that case, Option 3 of the interaction between EU ETS and Eco Tax would be an interesting policy.
- The future of REA depends on both the development of RES and the political weight given to the target of increasing renewable energy. If the development of the RES industries is judged to be beyond the early stages, a change towards green electricity certificates could be discussed. However, for the development of RES the dynamic efficiency plays a pivotal role. Thus, changes in the incentive system for RES should be based on a thorough analysis of the innovation systems of RES.

Besides these policy making conclusions, the interaction analysis between the Eco Tax and the Directive also revealed certain interesting aspects relevant for **policy making in general**:

- The results of the interaction analysis depend on many aspects, such as stringency of targets, outcome of the allocation plan, or even details as the provisions for cancellation of allowances.

- There are many trade-offs in evaluation, not only between environment, efficiency, and equity, but even between static and dynamic efficiency.
- In order to derive policy conclusions, it is necessary to weigh the different criteria against each other.
- Equivalence of effort is difficult to assess; and can even be improved by double regulation.

Aiming at high or beneficial interaction seems to require higher levels of fine tuning of policies. This can be interpreted as a trade-off between high interaction and feasibility of policy making. Finally, the cases analysed clearly demonstrate that there are **different policy objectives** within energy and climate policy. Besides the reduction of greenhouse gases, objectives such as reducing the use of fossil fuels, increasing in renewable energy, or changing the tax base in order to reduce the cost for labour all play a significant role. The existence of parallel instruments, should be evaluated in light of the different objectives they are designed to meet.

The introduction of trading instruments is not an incremental policy innovation, but rather a **change in policy paradigm**. The interaction analysis reveals certain insights into the problems of such a substantial policy innovation. New, innovative instruments such as emissions trading have to be introduced in addition to existing instruments which interact with the new instrument. Thus, the new instrument has to be adapted to the pre-existing institutional and instrumental context. There is a certain **path dependency in policy making**, which constrains the implementation of new instruments, and which makes it necessary to search for transition strategies. Perhaps the approach of innovation systems and the debate on transition management of large technological systems – e.g. the creation of niches to facilitate a change in trajectories – could give some interesting insights for the future analysis of policy instrument innovations.

8.7 Further reading

Walz, R. and R. Betz (2003), *Interaction of the EU ETS with German climate policy instruments*, FhISI, Karlsruhe, Germany, available from: http://www.sussex.ac.uk/spru/environment/research/interact.html.

9. Interaction of the EU ETS with French climate policy

9.1 Introduction

This section presents an overview of the implications of the proposed EU ETS for some selected energy and climate policy instruments in France. It summarises the results of research that has been conducted by the Centre International de Recherche sur l'Environnement et le Developpement (CIRED), as part of the INTERACT project.

This summary argues that the implementation of the EU ETS will not lead to major problems of policy interaction in France, provided that care is taken to reduce some of the inconsistencies. Since France is in the process of integrating parallel policy measures into a broader policy mix there is time left to promote synergies with the EU ETS.

9.2 Climate policy context

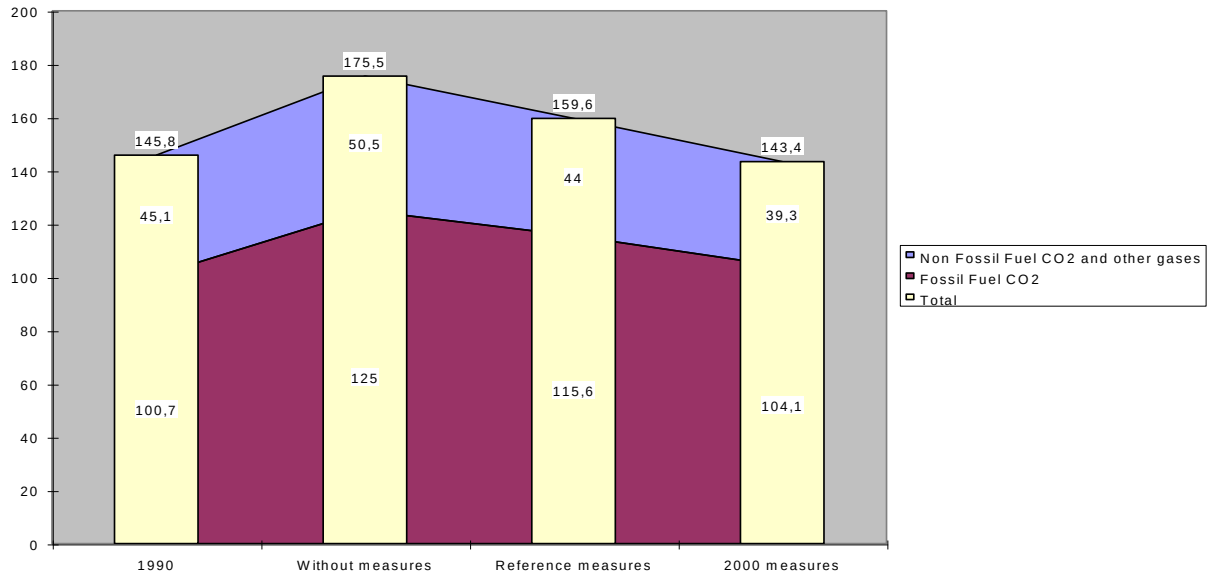
CO_2 emissions accounted for 70% of French GHG emissions in 1999, while N_2O and CH_4 accounted for 16% and 12% respectively. The sectoral contributions included transport (27%); agriculture (16%), industry (20%), and buildings (20%).

GHG emissions in 1999 were approximately the same as the Kyoto base year of 1990. However, this was partly a consequence of economic trends, including the recession of the early 1990s which reduced emissions. Moreover, increases in CO_2 emissions were compensated by decreases in CH_4 and N_2O. CO_2 emissions increased by 6% between 1990 and 1999, but this reduces to 3% after taking into account carbon sinks.

The French target under the EU burden sharing agreement is for a stabilisation of GHG emissions at 1990 levels, which means a 10% decrease against the official baseline scenario. However, this scenario is very sensitive to assumptions about economic growth. If the growth rate in the reference scenario is increased from 2.2% to 2.8%, this implies a 19% emissions reduction. The uncertainty relates primarily to household and transport emissions.

A post Kyoto climate program was published in January 2000. This contains an objective of meeting the Kyoto obligations solely through domestic measures, unless economic growth is higher than expected. The programme considers two types of measures: 'reference' measures decided and implemented before the adoption of the Kyoto Protocol, and 'additional' measures decided since Kyoto. Figure 9.1 compares projections of 2010 GHG emissions under three scenarios: business as usual (no measures), reference measures and additional measures.

Figure 9.1 French GHG emission projections



The global target of the national program is to save 16 MtCe by 2010, split as follows: transport 4MtCe (25%); industry: 3.42MtCe (21.4%); buildings: 2.66MtCe (16.4%); energy: 2.63MtCe (16.2%); other: 3.3MtCe (21%).

The Program anticipates the biggest emission reduction to result from energy and N_2O taxation. The proposed measures included purchase tariffs for renewable electricity, fuel switching in electricity generation, promotion of CHP, more stringent thermal regulation for new buildings, and taxes and standards for N_2O. An industrial energy tax was proposed, combined with voluntary agreements and lump sum rebates for energy intensive industries. But the tax proposal was subsequently abandoned following its rejection by the 'Conseil constitutionnel', creating difficulties for French climate policy.

9.3 Selected climate policy instruments

Three French policy instruments have been selected for an examination of their potential interactions with the EU ETS. These are as follows :

- *The industry voluntary commitment framework*: On July, the 18th, 2002, the French government welcomed a voluntary framework for greenhouse gas emissions mitigation launched by three industry organisations: MEDEF (Mouvement des entreprises de France), AFEP (Association française des entreprises privées) and EPE (Entreprises pour l'Environnement). French industry aims to gain experience with emissions trading with this framework, which includes the possibility of allowance trading. The framework should therefore provide an experimental GHG market.
- *The 'installations classées' (IC) regulation:* The French regulation on 'installations classées' dates from 1976). This is an integrated pollution prevention and control law, which has similarities with many aspects of the IPPC Directive. Many of the industrial

installations regulated by ‘installations classées’ regulation will also be participants in the EU ETS.

- *Feed-in prices and the obligation on utilities to purchase ‘green’ electricity:* The framework established by the French Electricity Law (2000) aims to support renewables by providing for mandatory purchase of renewable electricity at a fixed price by electricity utilities. The utilities are also participants in the EU ETS.

Comprehensive analysis of the potential interactions between each of the above instruments and the EU ETS is provided in the INTERACT project report for France. The following three sections provide a summary of this analysis. One policy option is identified in each case and specific policy recommendations are provided.

9.4 Interaction between the EU ETS and the industry voluntary commitment framework

The voluntary commitment framework allows companies in the manufacturing, energy and service sectors to reduce their emissions on a voluntary basis, but does not provide any direct incentives for emission reduction. Targets are defined for 2004 and 2007 and penalties will be applied in case of non-compliance at the end of each commitment period. Enterprises willing to participate have to submit their objectives by mid 2003 to the *Association des entreprises pour la réduction des gaz à effet de serre* (AERES). This body includes representatives from most energy intensive French industries, together with government officials acting as ‘experts or observers’. To date, it has approved four company commitments in the chemicals and cement sectors.

The official objective of French industry in proposing this framework is to gain experience in target setting and emissions trading. Hence, the framework foresees firms trading GHG allowances on an experimental market within France. Table 9.1 summarises the differences between the French scheme and the EU ETS.

Table 9.1 Main features of the French voluntary commitment framework and the EU ETS

French trading scheme	**EU ETS**
Timing : 2003-2004 ; 2005-2007	Timing : 2005-2007 ; 2008-2012
Voluntary; Open to all sectors	Mandatory ; Open to a limited number of sectors
All 6 Kyoto GHG; direct emissions only	Only CO_2 for now
Absolute and relative targets	Only absolute targets
Open to projects	Link to projects to be determined
Possible to modify the targets	Not possible to modify the targets
Banking allowed	Banking to be determined by Member States between 2007 and 2008, then allowed
Electronic allowance tracking registry	Electronic allowance tracking registry
Seller liability	Seller liability
Financial penalty at a level yet to be determined, no restoration of excess tons	50 €/t CO_2 in the first period, 100 afterwards, or twice the average market price, whichever is the highest. In addition restoration of excess tons is required in the following year

However, in addition to gaining experience with emissions trading, industry had at least three other goals.

First, it wanted to reduce the prospect of a carbon/energy tax scheme in France. Such a tax was proposed by the government, but then rejected by the Conseil Constitutionnel (the highest court). The government did not table a new proposal, and the project has been stalled since then. However, carbon/energy taxation could resurface, especially if the government looks for new sources of taxation to reduce the national deficit.

Second, it wanted to challenge the target in the French climate program for a 28% reduction in industrial sector emissions compared to 1990 levels by 2010. It hopes that France will submit a national implementation plan that includes a weaker target for industry.

Third, it wanted to influence the negotiation of the EU ETS. In particular, it wanted non-CO_2 GHGs to be included, possibly on an opt-in basis, in order to benefit from the low-cost abatement opportunities for N_2O that are available To achieve this, industry needed to demonstrate to European institutions that adequate monitoring methods are available.

The proposed scheme has serious drawbacks. A profit-maximising firm has no reason to undertake costly abatement commitments unless it expects to be a net seller. While firms may have the subsidiary objective of gaining experience with emissions trading before 2005, this incentive is likely to be relatively weak. Since a market cannot exist with only sellers, the emergence of a significant French allowance market appears unlikely, as does GHG abatement above business-as-usual.

However a final objective of the scheme is to prepare the French national allocation plan under the EU ETS. Most firms that are eligible to take on commitments under the French scheme will become eligible for joining the EU ETS in 2005. If the French government uses the voluntary commitments as a basis for setting its allocation plan, as expected by French industry, a firm may have an incentive to voluntarily take on a commitment rather than directly negotiating its allowance allocation with the government. Conditions for real abatement under the French scheme then become

- the government makes clear that it will base its national allocation plan on the voluntary commitments provided these are consistent with the allocation criteria in the Directive and the targets in the French climate programme; and
- 'peer pressure' among industries ensures that the commitments under the French scheme are consistent with these criteria.

If these conditions are met, the commitments under the French scheme will form the basis of the national allocation plan. If this plan is approved by the European Commission, it will form the basis of French targets under the EU ETS. The French voluntary scheme will thus have no rationale from 2005 onward for sources covered by the Directive, but might foster early mitigation in 2003 and 2004. For emission sources not covered by the Directive, the commitments under the French scheme will continue until 2007, creating a three year period during which the scheme will coexist with the EU ETS. However, since relatively few sources are likely to be covered by the French scheme but not by the EU ETS during this period, the French-only market from 2005 onward may be relatively small. If the above conditions are not met, the French scheme will most likely fail to provide both real abatement and real experience in emissions trading.

From the interaction analysis, it appears that the key issues lie in :

- differences in gas coverage, entailing difficulties in monitoring, allocation, registration and compliance;
- differences in targets, with French scheme using relative rather than absolute targets, which could lead to distortions of competition
- differences in non-compliance penalties;
- the practicability of the French scheme from 2005: only net sellers would have an interest in participating.

Coexistence of the French scheme with the EU ETS raises a number of complex issues and is potentially problematic. For example, double regulation may arise if an installation has *both* a commitment under the French scheme *and* an allocation under the EU ETS for the same emission sources. In this case, marginal abatement costs for the affected installation will be equal to the sum of the allowance prices in the two separate markets. Such a scenario holds no benefits for the affected installation, which may be expected to reduce abatement costs by relinquishing the commitments under the French scheme. However, in some circumstances the affected emissions sources at an installation may form a subset of the total number of sources covered by the voluntary commitment. Dividing these sources between the EU ETS and the voluntary commitment is likely to involve renegotiation of the targets in the latter, which will entail additional transaction costs.

Policy options

The primary policy option is to utilise the opt-out provisions of the EU ETS. Installations using this option who wish to maintain the existing voluntary commitment would need to demonstrate 'equivalence of effort'. While this improves political acceptability, it raises a number of difficult issues.

- The opt-out possibility could narrow the sectoral coverage of the EU ETS and hence could threaten the effectiveness of the trading market.
- The EU ETS and the voluntary commitment cover different emission sources in different ways. For example, the voluntary commitment covers non-CO_2 GHGs while the EU ETS does not. This means that firms could be in compliance in the French scheme through reducing non-CO_2 GHGs (or buying allowances from non-CO_2 reductions) whereas they would not have been so in the EU scheme where firms concentrate their efforts on CO_2 reductions. The firms who opt-out could then accumulate a bank of allowances before 2008 coming from the net sellers at the French level not covered by the EU scheme.
- Relative targets are not equivalent to absolute targets because they give no certainty in the environmental outcome and lead to higher emissions for the same level of marginal abatement cost (Gielen et al, 2002).
- There is a risk that some CDM or domestic projects are eligible for crediting in the French system while not in the EU ETS.
- The French system fails to provide equivalence of sanctions, since the penalty is only 10 €/tCO_2, versus 40 to 100€/tCO_2 plus restoration of missing tons in the EU ETS. It also fails to provide equivalence of verification, since this is the responsibility of AERES rather than an independent organisation.
- The EU ETS foresees the possibility for enterprises or umbrella group to take commitments which is a matter of concern for the stringency of the targets and hence for the verification of emission reductions. In such a case differential treatment could occur.

To conclude, the last December 2002 deal offers a window of opportunity for the practicability of the French scheme by 2008. However, the key issues in terms of environmental effectiveness (including monitoring of non-CO_2 emissions, allocation, registration and compliance difficulties) remain the same. The key difference lies in the way installations are sanctioned for non-compliance.

In essence, the new deal delays adjustments that should have been clarified as soon as possible.

9.5 Interaction between the EU ETS and the French legislation on 'installations classées'

The French regulation on 'installations classées' (IC) dates from 1976 and forms a framework for integrated pollution control. Since 1976, it has been amended various times, in particular with 'Arrêté intégré' of February 1998 related to emissions from IC requiring an 'authorisation' before undertaking any activity. The European IPPC Directive did not entail major amendments to the French regulation because the principles and technical requirements were already provided by the IC and because the coverage was wider than IPPC.

Some of the industrial installations regulated by the IC regulation will also be participants in the EU ETS. Hence, the interaction in the operation of these instruments is of particular interest.

From the interaction analysis, the two instruments appear to be broadly compatible. The key issues lie in the necessary evolution in the IC regulation in order to fulfil the emissions trading requirements:

- Emissions trading will reinforce the IC regulation which does not include emissions limits for CO_2. Installations are required to adopt best available technology (BAT) for energy efficiency, in a similar manner to the IPPC directive. The BAT recommendation for energy efficiency is indicative rather than mandatory and is not interpreted strictly. Hence it is unlikely to present a major obstacle to emissions trading.
- The permit procedure is shared by both instruments. Although Article 8 of the directive recommends that permitting procedures are combined, Member States are not obliged to do so. If the permit procedure were combined at the French and EU level, then the monitoring and reporting requirements would be also. But emission trading is likely to require more accurate emission monitoring. Emissions trading will supplement the IC regulation by requiring an installation to hold enough permits to cover its emissions. Similarly, the definition of penalties for the EU ETS will reinforce compliance with the IC regulation. The implementation of such a verification can lean on the 'inspection des installations classées' regulation which must be reinforced to be effective.

Policy options

As with the voluntary commitment, the primary policy option is to utilise the opt-out provisions of the EU ETS. Installations using this option will need to demonstrate that regulation under IC is 'equivalent'. This will be difficult. In practice, it will be necessary to reinforce the IC regulation and to include CO_2 emissions limits.

The BAT requirements under IPPC are fairly flexible and allow standards to be differentiated between installations. Hence, the static economic efficiency of this instrument is better than is often thought. Installations subject to the EU ETS are free to choose between abatement options and have the opportunity to minimise abatement costs. But extensive use of the opt-out option could create a situation in which the number of participants is not large enough to benefit from significant abatement cost differences among firms. Market power could also occur in that case.

The process of demonstrating 'equivalence' could be costly and time-consuming. One option would be to estimate the allocation to different installations under the EU scheme and to assess whether their existing targets are equivalent to this estimated allocation. But this implies considerable effort to assess bottom-up allocations, which seems unnecessary when the intention is not actually to allocate allowances. Conversely, if Member States choose to interpret equivalence in a loose way, this may leave them open to challenge under EU competition law. A combination of severe information asymmetry, the tight time schedule for approving allocation plans and the desire of all parties to minimise the obstacles to implementing the EU ETS may allow such opt-outs to proceed unchallenged. But there is a risk that allowing opt-outs could lead to distortions of competition.

On balance, the opt-out has some serious drawbacks. It threatens environmental effectiveness and economic efficiency, as well as introducing differential treatment and distortions to competition. If opt-outs are allowed and if standards are established in France for those industries that opt-out, an option could be to set up :

- an output-based allocation for the industries participating in the emissions trading scheme.
- Performance standards for the industries regulated by the IC.

This option should reduce differential treatment.

9.6 Interaction between the EU ETS and the feed-in prices for renewables electricity

The promotion of electricity from renewables energy sources is a high Community priority for reasons of security and diversification of energy supply, of environmental protection and of social and economic cohesion. After the publication of the White Paper on Renewable Energy Sources in 1998, a Directive on the promotion of renewables was issued in 2001. The Commission aims to create a framework in which Member States ensure the promotion of renewable energy[11]. In France, this is established by the French Electricity Law (10-02-2000) which provides for the mandatory purchase of renewable electricity at a fixed price. Renewable energy producers are provided guaranteed outlets, and utilities have to purchase this electricity at a fixed price. Some of these utilities are also participants in the EU ETS..

Two issues are relevant to the interaction between the Electricity Law and the EU ETS:

- *double incentives*: major electricity suppliers could benefit twice from incentives to reduce CO_2 emissions, as both participants in the EU ETS and as renewables producers through their subsidiaries. This would induce differential treatment between the major generators and the small independent producers.
- *allowance allocation procedure*: The EU ETS requires that allowances should not be allocated to cover emissions which would be reduced or eliminated as a consequence of the renewables Directive. But it would be virtually impossible for an electricity generator that decides to substitute e.g. wind power for coal based electricity generation to demonstrate that this project is not implemented to comply with the renewables Directive, but to comply with the emissions targets of the EU ETS.
- *renewables targets*: The directive on renewable electricity sets a 21% target for France, which is far above the BaU scenario. Since no nuclear power plant or large dam is likely to be commissioned nor decommissioned until 2012, more renewable energy in electricity generation will entail less CO_2 emissions. As a consequence, if the French NAP is based on the target of 21% of renewable electricity and if this target is not reached, French electricity generation is likely to be a net buyer. This is not necessarily a big problem, however, because this sector will benefit from its low carbon content as compared to most European countries.

Policy options were not developed in this case because the two instruments operate separately. The option chosen to promote renewables through feed-in prices in France has no direct interaction with the trading market. The situation would have been quite different if ‘green certificates’ were used instead of feed-in prices.

[11] A guarantee of origin of electricity produced from renewables energy sources is foreseen, first step towards a European tradable green certificate market.

The ‘double incentive leading to differential treatment among renewables producers’ seems difficult to address. In fact, among the four major producers, only EDF and Société Nationale d’Electricité et de Thermique would benefit from this double incentive. The two others are hydro-electricity producers. To circumvent this double incentive, the allowances allocation could be operated at the installation level and not at the umbrella group level. This could allow more transparency on the allocation mechanism.

The second issue on the additionality of emissions reductions coming from the ETS implementation could also be circumvented by requiring the national plan submitted to the Commission to explicitly identify the emission reductions resulting from the renewables Directive.

9.7 Further reading

Boemare, C. and P. Quirion (2003), *Interaction of the EU ETS with French climate policy instruments*, CIRED, Paris, France, available from: http://www.sussex.ac.uk/spru/environment/research/interact.html.

10. Interaction of the EU ETS with Greek climate policy

10.1 Introduction

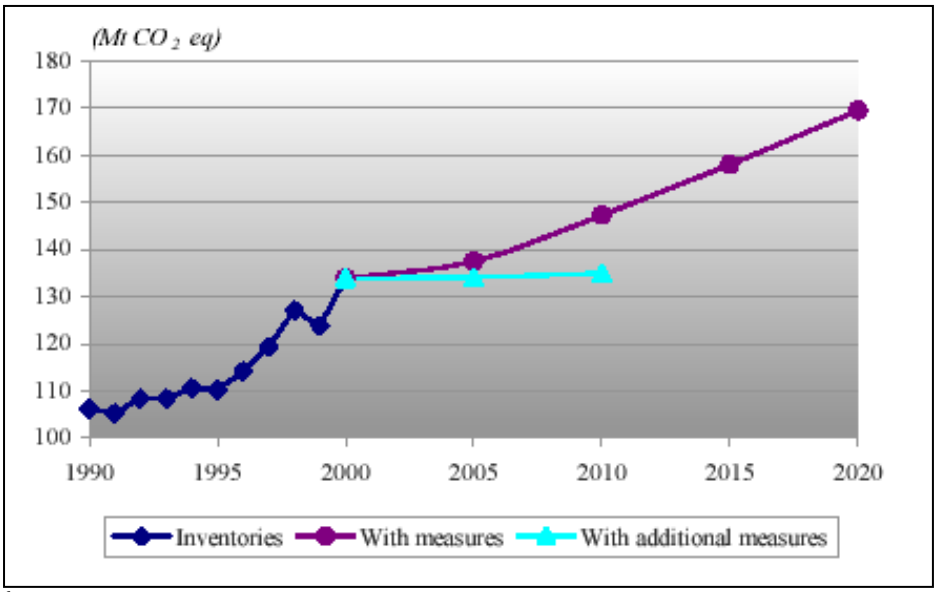
This section presents an overview of the implications of the proposed EU ETS for some selected energy and climate policy instruments in Greece. It summarises the results of research that has been conducted by the Energy Policy Group of the National and Kapodistrian University of Athens (NKUA) as part of the INTERACT project.

10.2 Climate policy context

The Greek target under the EU burden sharing agreement allows for a 25% increase in GHG emissions above 1990 levels (130MtCO_2e). This follows an earlier voluntary target, established in 1995 under the 'Hellenic Action Plan for the Abatement of CO_2 and other Greenhouse Gases', which restricted the overall increase in CO_2 emissions during 1990-2000 to 15% (± 3%) (MEPPPW, 1995). The margin of 3% was to allow for unpredictable domestic or international developments and relevant EU policy actions. The target in this action plan was not met, and GHG emissions in 2000 were 23.4% higher than in 1990.

In projections submitted to the UNFCCC, the Greek government forecast emissions to increase by 35.8% in 2010 and 56.4% by 2020 under a 'with measures' scenario. In response to these projections, the Ministry of Environment, Physical Planning and Public Works (MEPPPW) proposed the '2nd National Plan for the abatement of GHG emissions' in March 2002 (MEPPPW, 2002). The recommended measures in this plan are mainly targeted at the energy and transport sectors. As a result of these additional policies, GHG emissions are forecast to increase by 24.5% by 2010 compared to 1990 levels (i.e. remain approximately equal to 2000 emission levels). A comparison between the two scenarios is presented in Figure 10.1.

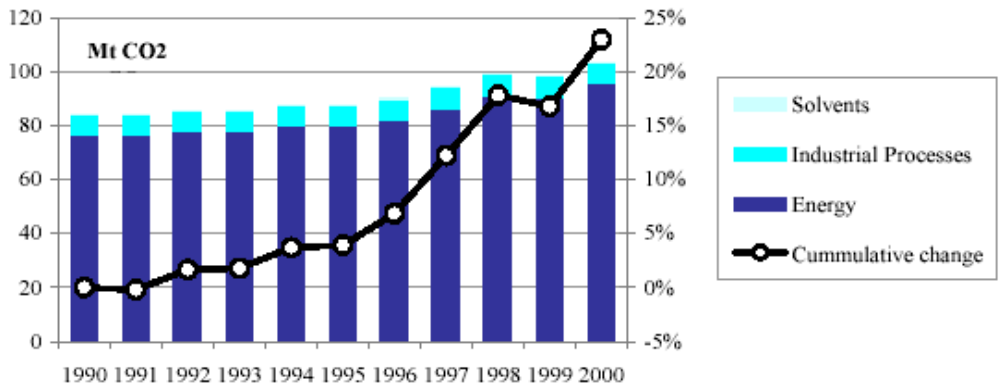
Figure 10.1 Projections of GHG emissions according to the "with measures" and "with additional measures" scenario.



Source: 3rd National Communication to the UNFCCC (2003)

Greece's CO_2 emissions per unit of GDP have been stable throughout the 1990s, unlike most other European and IEA countries, where CO_2 emissions per unit GDP have decreased. Per capita emissions in Greece are lower than the EU average, but emissions per unit of primary energy supply are the highest in the EU. This is a consequence of Greece's high reliance on lignite and heavy fuel oil and the limited contribution from renewable energy sources (RES). Lignite produces very high CO_2 emissions per unit of energy, while the efficiency of electricity production using lignite is low. The use of lignite for electricity generation leads to power stations being responsible for 50% of Greek CO_2 emissions, compared to an EU average of ~30%. Lignite accounts for 66% of national electricity production, with the remainder from RES, petroleum, hydroelectricity and natural gas. Energy related CO_2 emissions represent 92% of total national emissions, with the rest coming from industrial processes, mostly related to cement and lime processing (Figure 10.2).

Figure 10.2 CO_2 emissions per sector for the period 1990-2000



Source: 3rd National Communication to UNFCCC (2003)

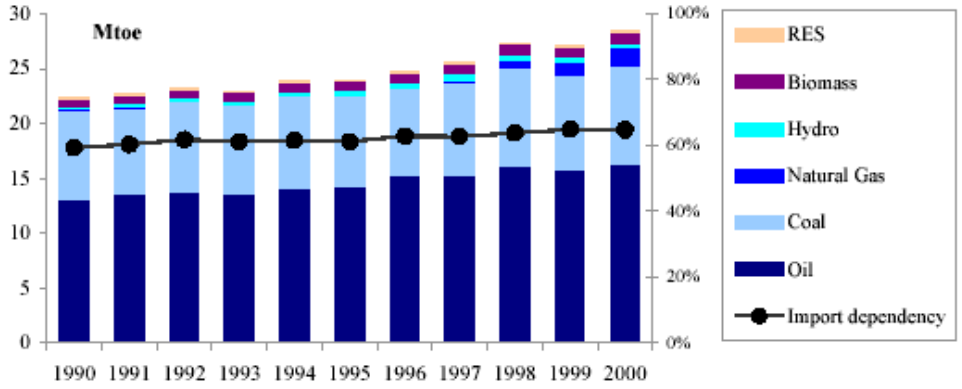
The Hellenic climate policy instruments implemented since 1994 are presented in Table 10.1. Developments in national climate policy are expected following the 2nd National Plan and the introduction of the EU ETS. The three policies that are expected to make the greatest impact on emissions are the promotion of renewable energy sources (RES), the further penetration of natural gas into the industrial and tertiary sector and the promotion of energy efficiency in the tertiary sector. The promotion of RES is expected to contribute up to 38% of the total emission reductions.

Table 10.1 List of Hellenic climate policy instruments

Programs-plans	
National Action Plan for the abatement of CO_2 and other greenhouse gas emissions (1995)	Energy 2001 (1995, Implementation in 1997, still in action)
Attica SOS, Thessaloniki SOS (1994-1995-1996)	Operational Program for Energy (OPE) (1994-1999)
National planning of Waste management (2000)	Operational programme "Railways, Airports, Urban Transport" (2001)
2nd National Plan for the abatement of GHG emissions (2002)	
Laws	
Law 2052/92 Measures for confronting urban pollution (smog)	Law 2244/94 Exploitation of Renewable Energy Sources
Law 2364/95 Introduction, haulage, trading and distribution of natural gas	Development Law 2601/98
Law 2773/99 Liberalization of the electricity market	Law 2941/01 installation areas and procedures concerning RES units
Taxes	
Road tax on motor vehicles	Special passenger vehicle, goods vehicle and motorcycle tax
Special tax on petroleum products	
Implemented EU Directives	
Directive 91/676	Directive 89/369 Ministerial Decision 82805/2224/1993
SAVE Directive 93/76 (1998)	Regulation 1836/93-EMAS
Directive 94/67 Measures and conditions for the prevention and restriction of the environmental pollution due to the combustion of hazardous waste	Directive 94/67 Measures and conditions for the prevention and restriction of the environmental pollution due to the combustion of hazardous waste
Integrated Prevention Pollution Control, (IPPC) Best Available Practices, BAT Directive 96/61 (Law 3022/2002)	Directive 96/62 Definition of general principles and responsible authorities for the assessment and the management of the air quality of the environment
Directive 98/77 Change of catalyst (National Law 5535/459/99)	Directive 99/30 and 2000/69 (speculative)

The absence of alternative solutions for meeting the country's energy demands restricts the selection of climate policies to those promoting RES and natural gas. The composition of the energy carriers (Figure 10.3) reveals this weakness. Oil and coal were the major energy suppliers for the period 1990-2000. Natural gas was introduced in 1997 and now accounts for 6% of gross inland consumption. Energy intensity increased during the last decade in all sectors apart from industry. This trend is expected to continue unless there are major changes in the structure of energy markets (e.g. liberalization or the introduction of RES) or if more stringent policy measures are introduced (e.g. energy taxes).

Figure 10.3 Gross inland consumption in Greece for the period 1990-2000.



Source: 3rd National Communication to UNFCCC (2003)

10.3 Selected climate policy instruments in Greece

The Greek policy instruments selected for analysis in INTERACT are:

- Three laws concerning the exploitation of RES, namely:
  - Law 2244/94 on the exploitation of RES;
  - Law 2773/99 on the liberalisation of the electricity market; and
  - Law 2941/01 on installation areas and procedures concerning RES units
- A future green certificate system for the support of RES, and
- Law 3010/2002, implementing the EU Integrated Pollution Prevention and Control (IPPC) Directive.

The nature of the interaction between these and the EU ETS is summarised in Table 10.2. A policy instrument describing a Hellenic Joint Implementation Scheme was also developed and compared to the three aforementioned RES- Laws.

Table 10.2 The nature of the interactions between the selected Hellenic policy instruments and the EU-ETS

Category	Policy instrument	Acronym	Direct	Indirect	Trading
Support for renewables	Laws	RES-Laws	√	√	
Support for renewables	Green certificates	TGC	√	√	√
Industrial pollution control	Integrated Pollution Prevention and Control (IPPC) Directive	IPPC	√		

A common theme throughout the project was opposition from various groups to the proposed EU ETS. The political acceptability of the EU ETS could be improved through:

- voluntary participation of the sectors in the scheme through opt in/opt out provisions;
- a governmental commitment that there will be no additional burden on the participating sectors such as energy/carbon taxes or energy efficiency requirements;
- fungibility with JI and CDM credits;
- recognition of credits created from domestic emission reduction projects;
- graded penalties related to performance; and
- free allocation of permits for as long as possible.

10.4 Interaction between the EU ETS and policies to promote renewable energy

Three laws provide the legislative framework for the exploitation of RES: law 2244/94, 2773/99 and 2401/01 (Table 10.1). These are grouped together under the abbreviation RES-Laws.

The first level of interaction between these laws and the EU ETS is in policy objectives. Despite the differences in primary objectives, the interaction is compatible and complementary since both instruments contribute to the reduction of GHG emissions even through different approaches.

In terms of the scope of the instruments, the major publicly-owned electricity supplier in Greece (the Public Power Cooperation, or PPC) participates in both. This company is one of the main (but not the sole) investor in RES projects within Greece. Its participation in an ETS offers three possible options: i) to request the competent Ministry to increase its tariffs so as to handle compliance costs, which in turn will affect its customers; ii) to adopt affordable energy efficient technologies or iii) to shut down some of its most polluting units.

The interaction in the operation of the instruments is also significant. The two instruments are considered to interact negatively if the EU ETS uses auctioning as an allocation method. PPC investments in RES may be restricted or even stopped, jeopardizing attainment of the RES target in the 2nd National Plan and consequently the country's compliance effort. The

revenues from auctioning may not be enough to assist the promotion of RES projects. Grandfathering is politically acceptable and does not affect RES investments. The parallel function of RES and ETS markets is assessed by stakeholders as positive and reinforcing due to the argument that a portion of industries participating in an ETS will also invest in RES.

The possibility of a future Tradable Green Certificate (TGC) scheme in Greece was also explored. The interaction between this and the EU-ETS for the Hellenic case appears broadly neutral. If trading interaction is promoted between the two instruments, the results should be positive and reinforcing.

Two policy options were considered as the most appropriate. The first concerned the promotion of additional policy instruments for the support of RES – notable a TGC scheme - combined with opt-outs from the EU ETS. The second concerned the introduction of the EU ETS together with the promotion of RES using the current framework. During discussions at the first stakeholder workshop a new suggestion emerged. This involved a combination of new policy instruments that encouraged investment in RES, together with modifications to the EU ETS to make it more politically acceptable (as above). The evaluation of these three policy options showed that the third scored higher than the other two against the evaluation criteria.

10.5 Interaction between the EU ETS and the implementation of the IPPC directive

The Hellenic implementation of IPPC was long and delayed. It took longer than expected to: a) modify the national legislative framework and update pre-existing laws; b) complete studies on the implementation of IPPC; c) prepare national guidance on BAT; and d) register a large number of industrial units in an emissions database. In addition, there were problems with reporting formats for operators and the availability of relevant data. Problems continue in areas such as the monitoring and estimation of emissions.

IPPC promotes energy efficiency but does not specifically regulate CO_2 emissions. In practice, this means that the objectives of IPPC and the EU ETS can be considered broadly reinforcing.

There is significant (but not complete) overlap in the target groups of the two instruments, since the participants in Phase 1 of the EU ETS (e.g. combustion plants, oil refineries, coke ovens etc), are all regulated under IPPC. However, many IPPC sectors lie outside the scope of the EU ETS, while small combustion plant (>20MW) are included in the EU ETS but lie outside the scope of IPPC. Groups affected by both instruments may be concerned that the double regulation will increase costs and impact upon their competitiveness.

There is considerable overlap in the administrative responsibilities for IPPC and the EU ETS, for example in monitoring, reporting and verification. This suggests scope for minimising administrative burdens.

Two policy options were considered as most suitable. The first was to delay the implementation of the EU ETS in order to properly complete the implementation of IPPC. This is attractive as IPPC procedures will facilitate the subsequent operation of the EU ETS.

Also, emission reductions resulting from action taken under IPPC could be allowed for within the EU ETS allowance allocation.

The second option was to use a strict interpretation of the IPPC energy efficiency requirements for those sectors or installations that are not willing to participate in the EU ETS. These sectors or firms will have to demonstrate equivalence of effort by accepting emission limit values and adopting BAT for energy efficiency. However, since not all sectors will accept emission limit values, financial incentives should be considered. Emissions gains due to IPPC might be considered as commodities under specific conditions. If objections are handled through such approaches, then the IPPC implementation will be improved and the ETS implementation facilitated. This second policy recommendation was preferred in the stakeholder workshop.

10.6 Lessons from the Hellenic case

Through the discussions in the stakeholder Workshops it was apparent that the main issue for Greece is whether an emissions trading scheme can assist in the national efforts for achieving the Kyoto targets. For other Member States it seems as a useful market-based instrument, but for Greece there is still much scepticism. The opinion of the competent Ministry regarding the EU ETS appears to be different from a significant fraction of the relevant target group. The Ministry opposes the introduction of the EU ETS due to its perceived high compliance costs compared to the proposed measures in the 2nd National Plan. On the other hand, many sectors are willing to participate in such an instrument due to the financial opportunities that are created.

However, the current legislative framework for RES appears to be malfunctioning and the policy objectives may not be achieved. So, solutions should be sought that make the ETS supplemental to the existing national policy instruments.

This second point is that the interactions relate largely to one target group, and in particular to one publicly owned company - the PPC. For Greece there is a "mono-target group interaction". PPC is the only target group that is affected by every national climate policy instrument even if that instrument is voluntary as in the case of the RES-Laws. Other target groups that are included in the proposed EU-ETS have the option not to participate in RES-Laws. The role of PPC in the RES-Laws is substantial since the investments of the company in the transmission network will assist the exploitation of RES even more. The proposed EU-ETS therefore creates financial problems for PPC which may have difficulty in meeting its obligations.

10.7 Policy implications

The Hellenic case has no apparent commonalties with the other Member State case studies countries in the INTERACT project. This discrepancy relates to on the following parameters:

- Greece is assigned a 25% *increase* in GHG emissions in the EU burden sharing agreement.
- The Greek contribution to total EU CO_2 emissions is very small compared to other MS (2.5% in 1990 and 3% in 2000) (EEA, 2002);

- The bulk of national emissions are from the electricity sector (48%) and primarily from one company, PPC;
- There is lack of information about climate policy in general and emissions trading in particular. Climate change is not a priority, but urban environmental policy is and especially for the city of Athens. Several measures have been announced recently concerning this issue.
- The per capita CO_2 emissions are relatively low compared to the EU average.

Current data and stakeholders' experience indicate the need for a turnaround within national climate policy. The best option will be to reinforce existing measures and policies by introducing new ones. A RES supporting policy based on pre-existing (the RES-Laws) and/or future (TGC) instruments appears unlikely to be sufficient to meet the country's obligations under Kyoto. But a simultaneous implementation of RES policies and the EU ETS may prove sufficient. The implementation of an ETS along with participation in the Kyoto mechanisms needs to be discussed and analysed further within Greece. The design and introduction of an emissions trading scheme adopting certain characteristics consistent to the Hellenic case should contribute to the achievement of national targets. Most of the implementation difficulties for an emissions trading scheme are now resolved due to the recently implemented Law 3010/2002.

10.8 Further reading

Mavrakis, D., P. Konidari, S. Vassos, D. Haralampopoulos and C. Pilinis (2003), *Interactions between European and Hellenic climate policy*, National and Kapodistrian University of Athens, Athens, available from: http://www.sussex.ac.uk/spru/environment/research/interact.html.

11. Conclusions

The INTERACT project has provided some useful theoretical results and contributed to the ongoing policy debate on the implementation of the EU ETS. Some of the key conclusions are summarised below.

11.1 The challenge of policy interaction

Policy interaction is neglected in the academic literature, with economics in particular preferring to analyse individual instruments in isolation. This is in marked contrast to the real-world of policy implementation where policy interactions can have a determinate impact on policy outcomes. As a consequence, there is a lack of research on how to co-ordinate instruments to produce an effective policy mix. This applies both to internal interactions between policies in the same policy area (e.g. climate policy), and external interactions between policies in different policy areas (e.g. environment and trade). The INTERACT project is focused solely on the first and has found that developing a coherent policy mix is challenging, even in this relatively well defined policy area. By implication, achieving coherence between policies in widely separate policy areas will be more challenging still.

As the number of instruments multiply, a policy area can become increasingly 'congested' (Majone, 1989). Policies are introduced to compensate for the problems and challenges created by other policies, rather than simply to address external problems. The EU ETS is a good example. The Directive look set to trigger quite fundamental reviews of Member State climate programmes only a short period after these programmes were introduced and regardless of whether the existing policies are 'working'. In the case of the EU ETS, the problem is compounded by the multiple levels of governance in the EU (including the rules on subsidiarity) and the relative unfamiliarity of emissions trading as a policy instrument. Furthermore, many Member States have developed national climate change programmes well in advance of the ECCP. Instead of this action providing a valuable early start for these countries, it now appears that a significant portions of these programmes will need to be abandoned.

But policy interaction need not lead solely to conflict. The limited amount of empirical research in this area has demonstrated that policies can work effectively in combination and that such combinations can often be more effective than individual instruments in isolation. The challenge, therefore, is to identify the circumstances in which this will be the case, and those in which it will not. A strong conclusion from the INTERACT project is that this can only be achieved through a systematic examination of:

- the *scope* of each instrument, where scope means the sectors, sites, portions of sites and individual emission sources that are directly or indirectly affected by each instrument;
- the *objectives* of each instrument and the extent to which these reinforce or conflict with one another;
- the *operation* of each instrument, including the aggregate effect of the different obligations and incentives when applied in combination.
- the *implementation* of each instrument, including the scope for rationalisation and harmonisation or regulatory responsibilities; and

- the *timing* of each instrument, including responses to 'triggers' and the scope for policy sequencing.

While such an approach can point to some general conclusions, such as the compatibility between information instruments and carbon/energy taxes, it is more usually the case that the degree of compatibility is context specific. Similarly, it is usually the case that different instrument combinations will involve trade-offs between criteria such as economic efficiency and political acceptability. The preferred combination will therefore depend upon the weight given to these different criteria.

11.2 Typologies of policy interaction

A common typology was found to be helpful in the study of policy interaction. The project distinguished between:

- *Direct interaction*: where the target groups directly affected by two policies overlap in some way;
- *Indirect interaction*: where either: a) the target group directly affected by one policy overlaps with the target group indirectly affected by a second (or vice versa); or b) the target group indirectly affected by one policy overlaps with the target group indirectly affected by a second;
- *Operational interaction*: where two policies operate together in that either: a) individual target groups (companies, installations, sources etc.) may move from one policy to the other under certain conditions; or b) the obligations and incentives imposed by one policy are deliberately modified as a result of the coexistence of a second policy.
- *Sequencing interaction*: where one policy which directly affects a target group is followed in time by a second policy which directly affects the same target group.
- *Trading interaction*: where two policies are linked by the exchange of an environmental trading commodity, such as a GHG emissions allowance.

In general, instruments that are designed and introduced without reference to each other may exhibit direct or indirect interaction, the consequences of which may be either positive or negative and usually unanticipated. In contrast, instruments that are designed and introduced as a package are more likely to utilise operational or sequencing interaction. Trading interaction is specific to trading-based instruments and is becoming increasingly important in the post-Kyoto mix.

11.3 Rationales for policy interaction

The INTERACT project has used this typology to develop a series of justifications for the coexistence of other instruments with a carbon emissions trading scheme. These justifications raise both theoretical issues regarding the legitimacy of government intervention and empirical issues regarding the design of individual instruments. In many cases there will be trade-offs between long-term and/or non-efficiency objectives and short-term increases in abatement costs. If the policy mix is to gain legitimacy, these objectives and trade-offs need to be made explicit.

Clarification of policy objectives is particularly important for instruments which coexist with a cap and trade emissions trading scheme (ETS). This is because such an ETS guarantees the attainment of a particular emission target. Hence, any instruments which directly or indirectly interact with an ETS will contribute nothing further to overall emission reductions since they will simply 'free-up' allowances which may be purchased and used by other participants. For example, an energy tax on EU ETS participants in the UK may well reduce UK emissions, but the 'freed-up' allowances will be purchased and used by participants in other Member States. The aggregate environmental impact of the scheme will therefore remain unchanged. Also, in the absence of market failures in both allowance and product markets, an ETS guarantees that the overall cap will be achieved at least cost. This implies that the use of a second instrument that directly or indirectly interacts with an ETS will increase the overall costs of meeting that cap.

These results apply both to instruments which directly affect CO_2 emissions from ETS participants, such as a carbon tax on fuel use, and to instruments which indirectly affect those emissions, such as a tax on electricity consumption of both participants and non-participants. With the EU ETS covering some 50% of EU CO_2 emissions, this applies to a large proportion of the policy instruments in each Member State climate programme. The implication is that, once the ETS in place, such instruments can no longer be justified through their contribution to emission reductions but only through their contribution to other policy objectives. This is important, as such instruments are at present *primarily* justified by their contribution to emission reductions.

Despite this, there may be legitimate grounds for introducing or maintaining other climate policy instruments that directly or indirectly interact with an ETS. These include:

- improving the static efficiency of the ETS by overcoming market failures other than CO_2 externalities;
- improving the dynamic efficiency of the ETS by overcoming market failures in the area of technology innovation and diffusion;
- delivering social objectives other than efficiency, such as equity and political feasibility; and
- compensating for deficiencies in the ETS design.

The INTERACT project has elaborated these broad rationales to provide justifications for each of the specific instrument combinations listed in Table 11.1. In each case, however, the validity of such rationales is context specific and open to challenge.

Table 11.1 Possible rationales for the coexistence of other instruments with a carbon emissions trading scheme

Type of interaction	Rationale
Direct and indirect	overcoming market failures inhibiting the adoption of energy efficient technologies
	overcoming market failures in the area of technology innovation and diffusion - particularly for renewable electricity
	achieving supplementarity through 'back-up' regulations
	raising revenue and capturing windfall rent
	achieving distributional objectives
Operational	using taxes to penalise non-compliance
	using 'hybrid' tax/trading instruments to mitigate allowance price uncertainty
	using opt-in provisions to extend the scope of the ETS
	using opt-out provisions to improve political acceptability
Sequencing	using trading to increase the flexibility of the existing policy mix
	using existing regulations as a basis for allowance allocation
Trading	Using horizontal trading interaction to achieve cost savings
	Using vertical trading interaction to achieve cost savings
	Using 'one-way' trading interaction to incentivise overcompliance

The fact that positive combinations between an ETS and other instruments are theoretically possible does not mean that such combinations will result in practice While the introduction of a carbon ETS should provide an opportunity to rationalise the policy mix, this may not always be taken. Once established, policy instruments tend to resist replacement even when a more viable alternative is available. This inertia may derive from a number of sources. For example: a legislative framework will have been established which may be difficult to change; regulatory institutions will have been established, or responsibilities assigned to existing institutions; procedures and standards will have been established for functions such as monitoring, reporting and verification; a network of private organisations will have become involved in implementation; and the target groups themselves will have invested substantial time and money in gaining familiarity with the policy instruments and putting the appropriate procedures in place. All these activities are separate from investment in abatement, but each will cultivate vested interests and encourage resistance to change. As a result, there is a strong possibility that many national policy instruments will continue after the EU ETS has been introduced, whether or not this is helpful to overall government objectives. The net result may be a mix of overlapping, interacting and conflicting instruments which lack any overall coherence.

11.4 Supplementarity and policy interaction

Perhaps the most interesting rationale for policy interaction is the use of 'backup' regulations to achieve supplementarity. This issue has been central to the climate policy debate since the Kyoto Protocol was signed, and the introduction of the EU ETS look set to reopen the debate in a different guise.

The issue is most clearly illustrated in the case of the UK, which has a domestic target for reducing CO_2 emissions which is more stringent than its target under the EU burden sharing

agreement. There is a tension between this domestic target and the flexibility offered by International Emissions Trading (IET). If the UK achieved this target and either banked or sold the surplus AAUs, the environmental rationale for the target would be undermined. Conversely, a decision to 'retire' the AAUs would entail substantial opportunity costs. Under IET, this decision rests with the UK government, which has been reluctant to indicate its preferred approach.

However, under the EU ETS, the decision rights for approximately one half of UK CO_2 emissions are allocated to private sector actors who can choose to trade allowances with participants in other Member States. The UK government is considering basing the EU ETS allowance allocation on the more stringent domestic target rather than the burden sharing target. But it does not appear to have recognised that such an allocation would *not* help in attaining the domestic target. This is because UK participants could simply purchase additional allowances from other Member States. While such an allocation would slightly increase the stringency of the overall EU cap, this is not the same thing as attaining the UK domestic target. Instead, the only way to ensure that the emissions of UK participants are consistent with the 20% target would be to introduce additional 'backup' regulations that directly or indirectly affected their emissions. This in turn would distort the operation of the EU ETS, raise costs for UK participants, lower allowance prices and potentially introduce distortions to competition.

11.5 Issues raised by policy interaction

The potential interaction between an ETS and other climate policy instruments raises four important generic issues:

- *Double regulation*: The issue here is the extent to which any apparent 'double regulation' will be seen as imposing unfair burdens upon particular target groups. Double regulation may be loosely defined as a situation where an individual target group is directly or indirectly affected by two or more instruments that have very similar objectives. While 'double regulation' is a negative term, there may be many instances where the interaction between policy instruments may be either acceptable or positively beneficial. To assess whether this is likely to be the case in any particular instance, it is necessary to examine the multiple objectives of each instrument, the obligations and incentives they place upon individual target groups, and the likely consequences in practice.
- *Double counting*: The issue here is the problems that arise when the compliance obligations for emission reductions are disputed - as may happen when two trading schemes coexist. This may lead to: a) *double slippage*, where the coverage of emissions is lost; b) *double coverage*, where two allowances are surrendered for a one-tonne increase in physical emissions; and/or c) *double crediting*, where two allowances are generated or freed-up for a one-tonne decrease in physical emissions. Each type of problem introduces complexity into the regulatory situation. But environmental integrity is only threatened when double crediting occurs without any compensating double coverage.
- *Differential treatment and equivalence of effort*: The issue here is the extent to which different groups are treated differently by environmental policy instruments and whether the obligations imposed upon one group can be deemed equivalent to those imposed upon another. Differential treatment may be challenged on legal, political or environmental grounds and is of central importance in the political debate over climate policy.

Demonstration of equivalence of effort may be required as a means to avoid differential treatment when an installation, company, sector or Member State is exempted from a particular policy instrument. But in practice, differences in the scope, form and stringency of policy instruments may make equivalence of effort extremely difficult to assess.

- *Trading interaction and the fungibility of trading commodities*: The issue here is the extent to which two trading schemes may be linked by the exchange of environmental commodities. The transfer of environmental commodities between two schemes will be governed by transfer and exchange rules which together define the *fungibility* of the trading commodities - which means the extent to which the commodity used for compliance with the first scheme can also be used for compliance with the second. These rules will determine the scope for trading between the two schemes and the consequences of such trading.

11.6 The EU ETS and policy interaction

The themes, issues and rationales summarised about were found to recur repeatedly in the empirical research in each Member State. The appropriate response will depend upon the estimated consequences of interaction and the weight given to criteria such as economic efficiency and environmental integrity.

The INTERACT project has made a number of specific policy recommendations for each of the participating Member States. These recommendations vary according to the specific circumstances of the Member State and the interpretations given by each of the research teams. But the following principles may be highlighted.

- *Goals*: The development of policy options should be based upon clear principles and long-term goals. For climate policy, a stable and effective policy framework is required during the Kyoto commitment period. This means that policy should be developed by *working back* from where we want to be in 2008, rather than developing short-term expedients.
- *Carbon pricing*: Energy users in all sectors should pay for carbon emissions, whether through taxation or emissions trading. In the long term, organisations in the public, commercial and industrial sectors should *either* be paying a carbon tax *or* participating in a trading scheme. Supplementary policies will be required to address other barriers to energy efficiency and to achieve other policy objectives, such as promoting renewables. But for each target group, only a single instrument should be used for carbon pricing.
- *Electricity:* The direct approach to electricity emissions used in the EU ETS is preferable to the indirect approach used in a number of national climate policies because: first, it gives compliance obligations for electricity emissions to the companies directly responsible for the control of those emissions, thereby incentivising both fuel switching and energy efficiency; and second, it facilitates cross-border electricity trade in the EU.
- *Targets:* Absolute targets are to be preferred over relative targets because of their greater environmental integrity and consistency with the national emission targets under Kyoto. And allowance based trading is to be preferred over baseline and credit trading due to its greater economic efficiency, lower transaction costs and consistency with the Kyoto framework. The EU ETS reflect these considerations while the many of the existing policies at the Member State level do not. The latter should therefore be considered as transitional measures only.

- *Supplementarity:* There is a risk that abatement in the EU ETS will be achieved through purchasing cheap 'hot air' from outside the scheme, rather than through domestic action. But domestic abatement may be incentivised by either restricting the interface between the EU ETS and the international carbon market, or by retaining (or establishing) 'backup' regulations for EU ETS participants. The first approach is preferable, but is dependent upon the final outcome of the proposed 'linking' directive. In general, 'backup' regulations should be avoided as they are likely to undermine economic efficiency, be more complex to administer and lead to additional costs for the target groups.

There are scope for debate over these principles and over the specific recommendations given in each of the case study reports. But the main point is to encourage wider recognition of the challenges and opportunities that the EU ETS creates.

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Annex 1: Dissemination activities

The project has been successful in engaging the attention of both academic and stakeholder audiences. This section summarises some of the main dissemination activities conducted to date.

Papers in academic journals

Boemare, C. and P. Quirion (2002), 'Implementing greenhouse gas trading in Europe: lessons from economic literature and international experiences', *Ecological Economics,* **43**(2-3), 213-230.

Boemare, C., P. Quirion and S. Sorrell (2003), 'Tensions between national trading schemes in Europe and the proposed EU Directive – a comparison between the UK and France', *Climate Policy*, forthcoming 2003.

Mavrakis D. and Konidari P. (2002) 'Classification of the design characteristics of emission trading schemes', *European Environment*, **13**(1), 48-66.

Smith, A. & S. Sorrell (2001), 'Interaction between environmental policy instruments: carbon emissions trading and Integrated Pollution Prevention and Control', *International Journal of Environment and Pollution*, **15**(1), 22-41.

Smith, A. (2003), 'Policy transfer in the development of UK climate policy for business', *Policy & Politics,* forthcoming 2003. Also available from: http://www.sussex.ac.uk/spru/publications/imprint/sewps/sewp75/sewp75.pdf

Sorrell, S. (2003), 'Who owns the carbon? Interactions between the EU Emissions Trading Scheme and the UK Renewables Obligation and Energy Efficiency Commitment', *Energy and Environment,* forthcoming August 2003.

Sorrell, S. and J. Sijm (2003), 'Carbon trading in the policy mix', *Oxford Review of Economic Policy*, forthcoming October 2003.

Smith, A. and J. Watson (2002), 'The challenge for Tradable Green Certificates in the UK', *ENER Bulletin,* **25**, 79-83.

Conference papers

Boemare, C. and P. Quirion (2001), 'Implementing greenhouse gas trading in Europe: lessons from economic literature and international experiences', paper presented at the CATEP *Workshop on Trading Scales: Linking Industry, Local/Regional, National and International Emissions Trading Schemes* hosted by the Fondazione Eni Enrico Mattei, Venice, Italy, December 3rd - 4th.

Smith, A. (2002), 'Policy transfer in the development of UK climate policy for business', paper presented at *The International Sustainable Development Research Conference*, University of Manchester, April.

Sorrell, S. (2003), 'Turning an early start into a false start: implications of the EU Emissions Trading Directive for the UK Climate Change Levy and Climate Change Agreements', paper presented at the *OECD Global Forum on Emissions Trading*, Paris, 17-18 March, available from: http://www.oecd.org/document/38/0,2340,en_2649_34359_2507110_1_1_1_37425,00.html.

Sorrell, S. (2003), 'The EU, carbon emissions trading scheme: will it work?', paper presented at the *British Institute of Energy Economics seminar on the Energy White Paper agenda*, London, 25th June.

Sorrell, S. (2003), 'Back to the drawing board: the implications of the EU emissions trading scheme for UK climate policy', paper presented at the *OXERA Energy Group quarterly meeting*, Oxford, 20th January.

Sijm, J. (2002), 'Trading of Emission Quotas and Green Certificates: the (draft) CO_2 Directive and the Renewables Directive', paper presented at the *European Energy Law Seminar,* Noordwijk aan Zee, the Netherlands, 23-24 September.

Quiron, P. (2002), 'Can Europe afford non-global CO2 emissions trading? The iron and steel industry case', paper presented at the 3rd workshop of the Concerted Action on Tradable Emission Permits (CATEP), Kiel, Germany, 30th September–1st October. Available from: http://www.ucd.ie/envinst/envstud/CATEP Webpage/Papers/quirion.pdf

Articles in non-academic journals

Sorrell, S. (2003), 'Good idea, shame about the practice', *New Statesman*, 24 February.

Sorrell, S. (2003), 'A challenging outlook', *The Utilities Journal*, March.

Sorrell, S. and F. Mullins (2003), 'UK perspective on emission trading schemes', *Joint Implementation Quarterly*, April.

Sorrell, S. (2003), 'Carbon trading and fuel poverty', *Energy Action*, forthcoming August.

Coverage in non-academic journals

The two UK case study reports received a great deal of media attention in the UK. Several publications provided substantive coverage of the reports, including:

- *ENDS Report*: November 2002, January 2003 and June 2003
- *Power UK*: January 2003
- *Energy in Buildings and Industry*: March 2003
- *Climate Change Management*: April 2003
- *In Tyndall*, forthcoming August 2003

Project web site

Outputs from the project have made been available on the project web site since May 2001. The web site is currently being revised and will ultimately host the reports and policy briefs listed in Table A.1. Interim reports from the project will no longer be available on the web site, but will be available from the project Partners. Table A.2 lists these interim reports.

Table A.1 Final reports from the INTERACT project

Area	Title	Partner
Final Report	Interaction EU Climate Policy – Final Report	SPRU
Policy briefs	Interaction in EU Climate Policy - policy brief	SPRU
	Interaction of the EU Emissions Trading Directive with UK climate policy instruments- policy brief	SPRU
	Interaction of the EU Emissions Trading Directive with Dutch climate policy instruments - policy brief	ECN
	Interaction of the EU Emissions Trading Directive with German climate policy instruments - policy brief	ISI
	Interaction of the EU Emissions Trading Directive with French climate policy instruments - policy brief	CIRED
	Interaction of the EU Emissions Trading Directive with Greek climate policy instruments - policy brief	NKUA
Member State Reports	Back to the Drawing Board: Implications of the EU Emissions Trading Directive for UK Climate Policy	SPRU
	The Climate Confusion: Implications of the EU Emissions Trading Directive for the UK Climate Change Levy and Climate Change Agreements	SPRU
	Interaction of the EU Emissions Trading Directive with Dutch climate policy instruments - final report	ECN
	Interaction of the EU Emissions Trading Directive with German climate policy instruments - final report	ISI
	Interaction of the EU Emissions Trading Directive with French climate policy instruments - final report	CIRED
	Interaction of the EU Emissions Trading Directive with Greek climate policy instruments - final report	NKUA

Table A.2 Interim reports from the INTERACT project

Area	Title	Partner
International context (WP1)	The international policy context	ISI
	Implementing an emissions trading scheme: lessons learnt from international experience	CIRED
EU context (WP2)	The EU Climate Policy Context	ECN/SPRU
Member State context (WP3)	UK policy context – emissions trading	SPRU
	Dutch policy context - emissions trading	ECN
	German policy context - emissions trading	ISI
	French policy context - emissions trading	CIRED
	Greek policy context - emissions trading	NKUA
Member State context (WP4)	UK policy context – non-trading climate policy instruments	SPRU
	Dutch policy context - non-trading climate policy instruments	ECN
	German policy context - non-trading climate policy instruments	ISI
	French policy context - non-trading climate policy instruments	CIRED
	Greek policy context - non-trading climate policy instruments	NKUA
Methodology	Policy design and policy interaction: literature review and methodological issues	SPRU
	Guidelines for work package 3	SPRU
	Guidelines for work package 4	SPRU
	Guidelines for work package 5	SPRU

Consultancy and related research activities

The topicality of the EU ETS has led to a number of opportunities for direct engagement with the policy process. These include the following:

- SPRU is part of a consortium undertaken consultancy work for the UK Department of Environment, Food and Rural Affairs (DEFRA) on the UK National Allocation Plan for the EU ETS. This project is led by National Economic Research Associates (NERA) in collaboration with AEA Technology and SPRU.
- SPRU has undertaken consultancy work for the UK Environment Agency, to provide recommendations regarding their position amongst the multiple climate policy instruments that are being introduced into the UK. The report, *Avoiding a policy glut over industrial energy use: IPPC, the Climate Change Levy, Negotiated Agreements and Carbon Trading* is available from the Environment Agency.
- SPRU helped the UK Sustainable Development Commission (SDC) compile a report that assesses, from a sustainability perspective, the energy and climate policy options being considered by the UK government Energy Review. The SDC report*: Forging An Energy Policy For Sustainable Development: a paper for the energy policy review of the UK*

government from the Sustainable Development Commission, is available at: http://www.sd-commission.gov.uk/pubs/energy/index.htm.

- SPRU advised the UK Carbon Trust in their preparation of a position paper on emissions trading. This formed part of the Trust's submission to the UK government consultation on energy policy.
- SPRU participated in a consultancy project for the UK Department of Trade and Industry, on 'Project Based Entry into the UK Emissions Trading Scheme'. This project was led by the Centre for Environmental Strategy at the University of Surrey, and also involved the Joint Implementation Network at the University of Groningen. SPRU's primary role was to identify the implications of existing and proposed climate policies for the calculation of additionality.
- ISI is part of a consortium undertaken consultancy work for the German government on the National Allocation Plan for the EU ETS. ISI is collaborating with the German Institute for Economic Research in Berlin and the Öko-Institute.
- ISI was deeply involved in the German discussion on an emissions trading systems. In January 2001, a working group "Emissions trading to Combat Climate Change" (AGE) was formed. This group consist of representatives of the federal government, the governments of the Länder, German industry, environmental NGOs and the Bundestag. ISI participated in the secretariat and various working groups, including one on policy interaction.
- ISI also prepared a guidance document on how to implement flexible mechanisms for the state government of Baden-Wuerttemberg. This documented served as an information basis of potential participants in the flexible mechanisms.
- ECN acted as an advisory member of the Sustainable Development Commission of the Social and Economic Council (SER) in the Netherlands. This Commission published advice on the design of a national CO2 trading scheme. See: www.ser.nl.
- ECN has completed: a) a study on the performance of national emission markets (together with the University of Groningen); and b) a study on the economic effects of grandfathering CO2 emission allowances, on behalf of the Dutch Ministry of Housing, Spatial Planning and the Environment. These studies are complete and reports are available on the ECN web site.

Other dissemination activities

- Jos Sijm (ECN) gave two presentations on Emissions Trading and Allocating CO_2 Allowances at the IEA-IETA-EPRI Expert Meeting/Workshop on Emissions Trading (Paris, 16-18 September 2002).

- SPRU authored a briefing note for the UK Tyndall Centre on Climate Change Research, entitled 'The renewables obligation: can it deliver?'. The paper is available at: http://www.tyndall.ac.uk/publications/briefing_notes/note04.pdf
- ECN gave a postal presentation on the INTERACT project at the '6th Annual Fall Meeting & International Conference' of the Emissions Marketing Association (EMA, Toronto, September 29 – October 1, 2002).
- ISI project team members participated as part of the German delegation to COP 6, COP6bis, COP 7 and COP 8.

- ISI organised a European workshop on *Integrating Kyoto mechanisms into the National Framework*. This workshop was held within the activities of the European Network for Energy Economics Research, a Thematic Network of the European Union Fifth Framework Programme (ENERGIE). It brought together academic and governmental representatives, with a special focus on perspectives for EU enlargement.

Annex 2: Researchers on the INTERACT project

The following researchers contributed to the INTERACT project at different stages:

SPRU (Science and Technology Policy Research), University of Sussex
Steve Sorrell
Adrian Smith
Jim Watson

Fraunhofer Institute for Systems and Innovation Research (ISI)
Regina Betz
Rainer Walz
Sina Wartmann

Centre International de Recherche sur l'Environnement et le Developpement CIRED
Catherine Boemare
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Energy Research Centre of the Netherlands (ECN)
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Dias Haralampopoulos
Christodoulos Pilinis
Margarita Vlami
Nikos Roukounakis
Alexia Vasila